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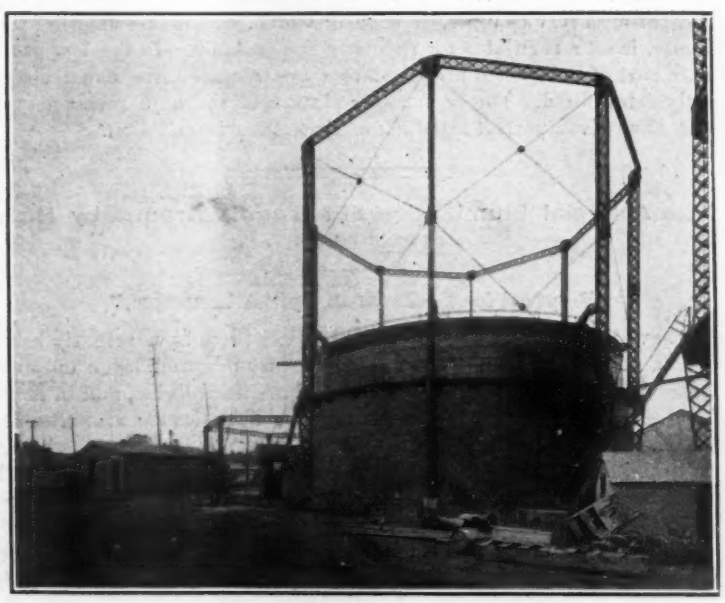
Increasing the Pressure in Gas Mains by Compressors.

The present arrangement of the distribution system of the New York and Queens Gas Company, at Flushing, L. I., quickly shows how a high pressure system can be availed of to increase the capacity of a low pressure system that had reached its maximum output. For the information herewith published we wish to acknowledge our indebtedness to Mr. Maynard H. Spear, the competent Engineer and clever Secretary-Manager of the Company named. The district served by the New York and Queens Gas Company is one of those that has grown most amazingly within the last decade, the crowning impulse thereto being extended in and through that noble engineering structure known as the Queensboro Bridge, supplemented by the fast passenger service, via the Pennsylvania Railroad and its tunnel under the East River. The great increase in population, coupled with the building boom necessary to house the people who fairly flocked to this really beautiful suburban district, put the Company in such plight that it became obligatory to at once erect a large storage holder or to provide some other means of getting the gas to the consumers under fair working pressure. As an instance illustrating the pressure eccentricities and difficulties, it may be mentioned that gauge readings, taken at the works, registered a 5-inch pressure, whereas at Bayside, just 7 miles away, the gauge charts indicated scant 1½ inches. Thus put on his mettle, with Directors rather demurring to large expenditure on main and service account, and also in respect of generating apparatus, Mr. Spear, after due consideration and counselling with his proprietors, decided to put down 4 miles of high pressure main, delivering the gas at 3½ inches into the old low pressure system on the line feeding Bayside, with the purpose of increasing the pressure both ways.

A small compressor house (Fig. 1) was built at the works, and two

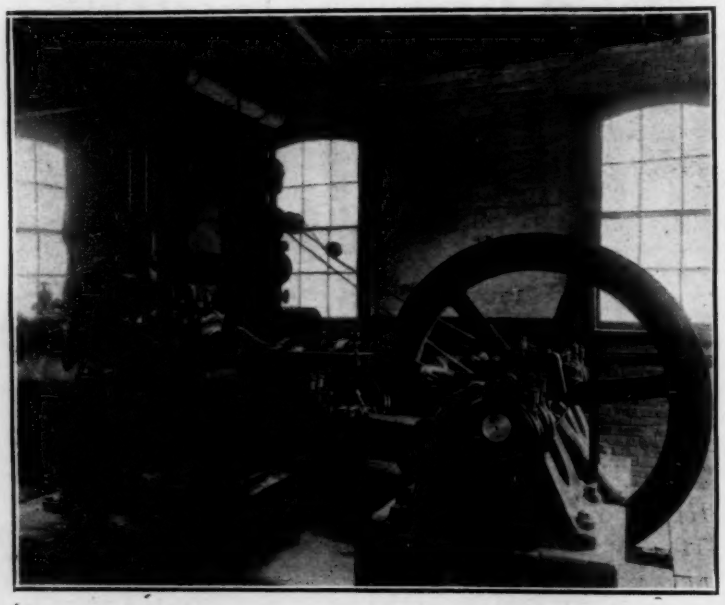


Laidlaw-Dunn-Gordon, steam-driven gas compressors (one of which is shown in Fig. 2) were installed. Both compressors are of the duplex type, the larger being 12-inch steam and 16-inch gas cylinders, with a stroke of 12 inches, and uses steam at about 100 pounds, compressing up to 50 pounds, while the smaller has 8-inch steam and 15-inch gas cylinders with an 8-inch stroke.

The compressors are connected so that either may be run independently, or both at once. The small one is generally in service during the day when the load is comparatively light, and the large one from 5 o'clock in the afternoon until 10 at night; or, should the load be exceptionally heavy, both can be used.

Gas enters the compressors at a pressure of about 5 inches of water, and is discharged into the mains at 30 pounds per square inch at the rate of 40,000 cubic feet per hour. Before entering the mains it passes through controlling and check valves, the latter, of course, preventing the gas from returning to the compressors.

The distributing system comprises 4 miles of high pressure and 84 miles of low pressure mains. The former are of 4-inch wrought iron pipe, having recessed, screwed couplings, the threads being covered with red lead and shellac before making up. In every 400 feet an expansion coupling is inserted, and at every 1,000 feet a gate valve. The fittings were furnished by the Dresser Manufacturing Company, Bradford, Pa., the valves (which were made especially) by the Lud-



low Valve Manufacturing Company, of Troy, N. Y., and the Eddy Valve Company, especial construction being obligatory, as ordinary valves are not (as a rule) dependable on for confining gas under high pressures. The main laying *per se* was done by the Sullivan Brothers, of Flushing. At the end of the 4 miles the 4-inch line is turned into a 20-inch line that forms part of the low pressure system. Gas is carried into the latter through two Reynold's regulators, set in a manhole in the street. From the high pressure mains consumers are fed through service pipes, in each of which, and before entering the house, is set a regulator for reducing the pressure. In the low pressure part of the system no regulators are required, the usual cocks only being fitted. The compressor plant and the high pressure system have given perfect satisfaction since their installation.

The Artificial Illumination of a Tennis Ground by High Pressure Gas.

[Prepared for the JOURNAL, by "A LONDONER."]

I have been told that in the United States there have recently been seen a number of instances of baseball grounds and large outdoor areas that were illuminated by means of artificial lights, and in England the use of artificial illumination for athletics has also been attracting attention. We hear of "fives" and "racquet" courts being so illuminated, and it is even said that one of the "League" football matches was played out by the light of arc lamps in an emergency.

A striking instance of this tendency to enable sport to take place in the night time was afforded in a recent installation by the South Metropolitan Gas Company, at Dulwich, near London, of high pressure gas lighting for a lawn tennis ground. The King of Sweden, who is enthusiastically devoted to this sport, some years ago arranged for an artificially lighted court at Stockholm (electricity being used in this case), but the present installation is on a very much larger scale.

The entire building measures 158 feet by 134 feet, and there is room for three complete courts. An account of the lighting was recently published in the *Illuminating Engineer* (London)[1], and it appears to be a unique installation in several respects. Everything has been done to assist the eyes of the players in following the course of the ball. The surface of the courts and the surrounding walls are all painted a dead black, so as to form a contrast to the white balls. Eight Keith, high pressure gas lamps are allotted to each of the courts, so there are thus 24 lamps for the courts in all, each consuming 25 cubic feet per hour, and giving 1,500 candle power. These lamps are hung at a height of 25 feet. Assuming the ordinary price charged for gas by the South Metropolitan Gas Company in this district the cost works out to about 6d. per court per hour. The lighting of each court is separately controlled from the entrance hall, so that it is only necessary to light up the particular section on which play is to take place.

1. May, 1911.

A feature of great interest is the remarkably high pressure—no less than 81 inches of water—which is used, the extra pressure being supplied by a small compressing plant of about 1-horse power, situated in an outhouse adjoining the main building.

The conditions of illumination required for the purpose in view are of a special character. It is essential that there should be sufficient illumination, distributed evenly over the courts, and—a very important point—there should not be any tendency to dazzle the eyes of the players. This last point is gained by the use of frosted glass plates, fixed immediately below each lamp. Above the mantle there is also a conical, silvered-glass reflector which serves to concentrate the light downward. The nature of these lamps is very clearly shown in Fig. 2, which picture was taken from the gallery, and brings out the diffusing glass plates very well. The screen overlaps the reflector by about 4 inches all around, and so renders it impossible for the mantle to be seen by the eye. The necessity for this precaution to avoid glare will be understood when it is explained that, in the course of the game, the ball is frequently sent up to a height of 30 feet or more among the lamps, so that the eye looking upwards must not be bewildered by the light.

In an article in the *Illuminating Engineer*, to which reference has already been made, some measurements of the illumination were given. It is stated that the average illumination over the court was about 4 to 5-foot candles. The value near the net, stretched midway across the court, is somewhat higher; and rightly so, as this is the center of interest to the players.

An interesting account is also given of some experiments with balls of different colors. Originally, red balls were tried, but eventually white ones were found to be the most satisfactory. In spite of the striking color, it appeared the red balls were very apt to disappear from sight when thrown upwards, the reason being, apparently, that the contrast in brightness with the black surroundings was not sufficient. It will be observed that the very dark nature of the surroundings really renders this a very difficult problem for the illuminating engineer to handle, since he gets practically no help from the reflection of walls and ceiling. From this standpoint it would perhaps have been thought better to use white surroundings and black balls. Apart from the fact that black tennis balls are not stock articles, and that white walls soon get soiled and show the dirt, however, there is another reason why white walls would possibly have been unsatisfactory; namely, the lack of restfulness to the eye. A high brilliancy would have been necessary for the sake of contrast, for it is well known that an extended, brightly illuminated, white surface is very fatiguing to the eye, especially when the gyrations of a small, rapidly moving object, like a tennis ball, have to be observed with this surface as a background.

A word or two may be said about the two photographs shown in Figs. 1 and 2, which give a very good idea of the general nature of

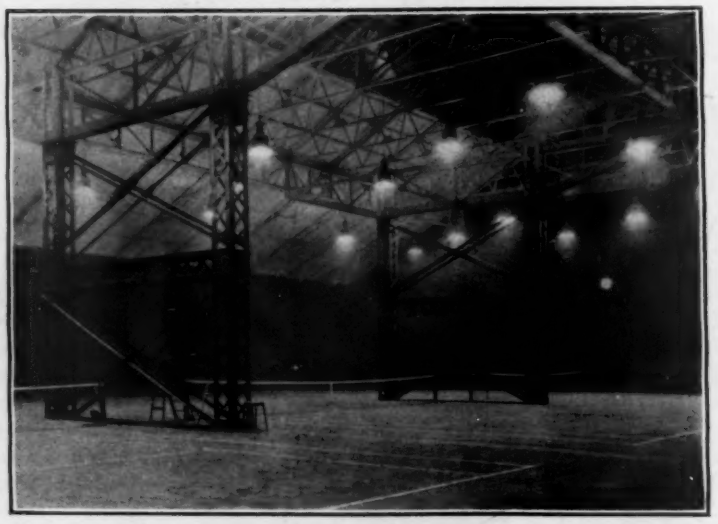


Fig 1.—View of Lawn Tennis Court at Dulwich, S. London, England, Lighted by High Pressure Gas. Seen from below.

the installation. These were taken entirely by artificial light and have not been retouched in any way. It will readily be understood that it is not an easy matter to take such photographs and to succeed in bringing out the requisite detail in the dark surroundings and without causing the lights to "flare." It is stated that success in this respect depends mainly on the exact determination of the ex-

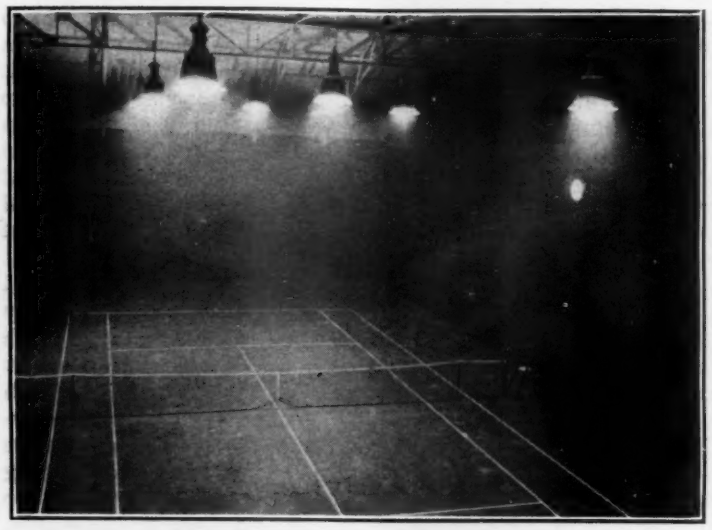


Fig. 2 —View of Lawn Tennis Courts at Dulwich, S. London, England, Lighted by High Pressure Gas. Taken from the Gallery.

posure by the aid of measurements of the surface-brightness with a small instrument made by Messrs. R. & J. Beck, of London, and known as the "Holophane Lumeter." This is an interesting example of photometry and photography working hand-in-hand.

As regards the remaining part of the installation, there is nothing very novel to be noted. The bathrooms are gas heated and gas ranges supply abundant boiling water. The corridors and offices, etc., are also lighted by low pressure lamps. It is interesting to notice that the burner employed is of the new "Metro" type, introduced by Mr. Carpenter, of the South Metropolitan Gas Company, this year, in which neither air nor gas adjustment is provided, the burner being permanently correct for the standard variety of gas manufactured by that Company.

This is regarded as a most striking example of artificially illuminated interiors for evening sports. The large building in which the tennis courts are placed was built especially for the purpose, and the success of this installation will doubtless lead to other buildings being erected. To many people, who are engaged in the daytime, the evening is practically the only time available for indulging in athletic exercises of this kind, and, by rendering this possible, artificial light is doubtless doing a great service to mankind.

[Continued from page 253.]

Rates for Gas Service.

[Prepared by Mr. C. L. Cory, C.E., for the Nineteenth Meeting, Pacific Coast Gas Association.]

Inventories.—Inventories of the actual physical property which taken together go to make up a modern gas plant and system should include the following:

Items.

Real estate.	Furniture and fixtures.
Buildings.	Automobiles, motorcycles, etc.
Gas works, including holder.	Stable equipment.
Street mains.	Tools.
Services.	Supplies.
Meters, regulators and lamps.	Working capital.

Real Estate.—A complete list of all real estate, used wholly or in part for the purpose of the manufacture and the supplying of gas, should be included in the inventory. The values placed upon this real estate should be determined in so far as possible by actual sales of property in the vicinity of the real estate in question when used for a similar purpose. The purpose for which the property is used must always be taken into consideration. Disinterested real estate men are usually able to give information leading to a rational decision in such matters. Unfortunately, assessments for taxation purposes are not of material assistance in appraising such real estate. On the other hand, the actual figures at which adjacent property is sold are rarely available.

When a gas company has real estate not actually in use, but is holding it for future occupancy, the question naturally arises should such real estate be included in arriving at the valuation of the plant for the purpose of determining the proper rate for the sale of gas at any given time.

In arriving at a conclusion in this matter, it is best to proceed upon the principle that it is proper to include all property actually required and used in the carrying on of the business at the time in question and *not* to include such real estate *not* required or used on the date the valuation is made. However, at some later period, when the real estate is actually put to use and occupied by buildings and equipment, that are parts of the operating system, in arriving at the valuation, there should be added interest and taxes during such time as the investment in such lands had been tied up but not productive. On any other principle, customers of to-day would pay a rate for service in excess of what they should and customers of the future may pay relatively less and thereby benefit unduly.

Buildings.—All of the buildings owned by the company as a part of its operating system should be included in the inventory, and so segregated that it will be possible to separate the structures, such as office buildings, etc., from the structures required as a part of the manufacturing plant. This should be done in order to obtain the cost of the manufacture of gas as delivered to the holders, separate from the general expenses connected with the operating of the property usually connected with the expense of the general offices of the company. The inventory costs of all buildings are usually best obtained from the plans, specifications and contracts or other records of the company. The condition of the buildings in general usefulness and probable future life should be taken into consideration in determining the probable value based upon original cost, cost of reproduction, new, and present value.

Gas Works.—The gas works inventory must include besides buildings all of the equipment necessary in the manufacture, metering and storing of gas, such as boilers, blowers, compressors, generators, exhausters, holders, heaters, pumps, piping, purifiers, scrubbers, and miscellaneous equipment. The date of purchase or contract, and the date when installation was commenced and completed, as well as the type of apparatus and by whom manufactured, should be included as a part of the inventory. When possible, the cost of each element of the entire manufacturing plant ready for operation segregating labor and material is desirable.

Street Mains.—An inventory of street mains is best obtained by tabulating and mapping from work reports all installations and removals for as long a period as records are available. Scaling street mains from maps, in order to obtain the aggregate length of the various sizes, should only be resorted to when the actual records of installation are not available. The size of all street mains, including fittings and accessories of every character and classified as to the material used, such as wrought iron, cast iron or casing, should be included in the inventory. In a similar manner the cost of replacing the street surface in the various kinds of paving should be determined from the most recent records available for such work.

The item of paving, in determining the value of underground street mains and services, has been variously considered. Every legitimate expenditure in adapting the utility to the progress and community growth, even if this involved the removal of the plant from one locality of the city to a distant and more remote location, is a proper charge to construction. All expenditures for putting down pavement by the company, as required by the city, or the cost of cutting through such pavement for extensions and construction purposes, and its replacement, are unquestionably proper capital charges. However, it is a question whether a gas company may properly capitalize the expense of municipal betterment which it has not borne, and when such benefits to the gas company are only incidental and can only exist from the standpoint of the cost of actually reproducing the underground system, after the street has been paved, when, as a matter of fact, the existing underground mains and services were laid before the paving was actually put down. The cost of such paving is not a proper element of value when the cost of laying such pavement has not been paid for by the gas company, nor any expense incurred therewith, providing, of course, that all costs borne by the company of changing the grade or depth of underground mains and services, in order to adopt them to conditions required for paving by the city, are included in the capital account.

Services.—In abtaining the inventory of services, it is most satisfactory to list all of these, obtaining thereby the size, length and character of each service as shown by the records of this department. Only that portion of the service belonging to the company should be included, and if consumers have paid for any portion of the service

that portion should not be considered as belonging to the company. The total value of the services should represent only those actually owned by the company, and in general should not include any services, or reproduction of any services, within customers' premises, unless the cost of the same has actually been met by the company.

In order to arrive at a unit cost of services, it is best to obtain the actual labor and material charge for a number of services installed in various parts of the district served, and at different seasons of the year, to get a reliable average cost per unit length of service.

Meters, Regulators, Etc.—The inventory of meters in service is usually readily obtained from the company's records. The inventory cost of the meters should include the necessary testing, painting and all storeroom expense. The cost of installing the meters should include all costs from the time the order leaves the general office until the order and record of installation are returned to the general office. The time cards of meter installers covering a considerable period can with great advantage be used to determine the cost of installing meters of different sizes.

Furniture and Fixtures, Automobiles and Motorcycles, Stable Equipment, Tools and Supplies.—Complete inventories should be made of the property owned and in actual use by the company for the carrying on of the business covering all subsidiary items such as furniture and fixtures, automobiles and motorcycles, stable equipment, tools and supplies. Only those supplies should be included which are active, and of the normal quantity carried in stock, and necessary for the operation of the company's business.

Working Capital.—A gas plant and system in operation must have working capital as well as fixed capital. Stores and supplies which are included in the fixed capital do not represent all of the working capital such plants require. There must be available a reasonable cash balance and other current allowances in order to operate economically and effectively. Just what sum represents a fair amount for working capital is nearly always a matter of judgment. From the amount of working capital usually carried by such companies, and from the amount that is required by other similar public utility corporations, it appears that, as an average for the year, a sum equalling the accounts receivable and cash on hand less the accounts payable and consumers' advance payments, is a reasonable allowance. The cash on hand, however, should be considered as that which is ordinarily required for the operation of the plant and the conduct of the business, including contingencies and emergencies, and should not include the capital or ready cash necessary for the construction of extensions or enlargement of the plant, or balances resulting from the sale of bonds or stock, or in any case exceed the amount normally needed and used by the company as an operatiog property.

Such an inventory, coupled with what might be called the inventory costs, serves to obtain the detailed and segregated costs of the various elements going to make up the physical property of the plant. In addition, in order to estimate the total valuation, it is necessary to ascertain, as nearly as may be, the time required for construction, in order that interest upon the investment during the construction period may be estimated. The cost of engineering, supervision, fire and casualty insurance, administration, legal expenses and other factors must also be obtained, preferably from the actual working conditions during which recent construction work was carried out.

Taken together, the cost of reproduction, new, of the physical plant, is usually considered as the sum of the elements above enumerated. The cost of reproduction, new, has been variously interpreted, sometimes erroneously, especially when it has been held to mean a system identical with the one the valuation of which is under consideration. Properly, it should be understood as a plant of similar character and equal efficiency. The age of the system will have much to do in indicating the fairness with which the cost of reproduction, new, is considered.

It will depend upon conditions as to whether the cost of reproduction, new, and the original cost vary materially. One of the principal differences which will be found will be in the size and capacity and number of units in the two cases. Gas plants are probably never built in a single year, nor used exactly as they were originally constructed for a number of years. The original cost will probably properly cover the plants as installed with small units, while the cost of reproduction, new, may be considered to cover only the cost of a smaller number of much larger units having the same aggregate capacity. Especially would this difference arise in connection with the distribution system, both mains and services. Originally one single main, on one side of the street, and of comparatively small size, may have been adequate to provide gas service in that particular vicinity. Later on it became necessary to lay an additional gas main many times larger than the original; and, as is often the case, this later main is laid upon the opposite side of the street, resulting in the cutting of all services leading to property on the side of the street where the new main is laid and the connection of those services into the new main instead of the old. As viewed from present requirements, one gas main alone might be considered in obtaining the cost of reproduction, new, while the actual cost would necessarily be greater.

Depreciation in its Relation to Valuation.—While the original cost, as well as the cost of reproduction, new, are ordinarily of the greatest importance in determining the proper valuation upon which earnings should be based, there is what is often called the present or existing value, or cost of reproduction, new, less depreciation, which must be given consideration in determining the valuation in question. Especially is this the case in plants, the rates for gas service from which have been ample to cover operating expenses, including depreciation, and a fair amount for interest and profits; but the amount collected for depreciation has not been used, as it should be, and set aside for replacing portions of the plant discarded because of their becoming obsolete, inadequate or worn out; but on the contrary has been distributed to the stockholders in the shape of dividends.

Depreciation should be considered as the amount that must be regularly set aside to cover all portions of the plant that are discarded because of wear-and-tear, inadequacy, obsolescence and general unavoidable decay. It is an operating expense and should be borne by the customers through the rate paid by them for the service rendered by the utility. But as it is paid by the customers it must be set aside by the company, and used when needed, for the renewal of worn out and useless portions of the entire system; but under no circumstances should the cost of such renewals be made an additional charge to the capital or construction account, except when the replaced equipment is of greater capacity than that which is taken out. Care must also be taken that the operating charge properly known as depreciation shall not be used for ordinary maintenance and repair. Actual additions and extensions to plant, which should be charged to the construction or capital account, replacement of equipment set aside as a result of depreciation, and ordinary repair and maintenance costs, must all three be most carefully separated and completely segregated in the engineering records as well as the financial accounts.

If construction, depreciation, repair and maintenance accounts are not so considered, and depreciation is borne by the customers as a result of being included in the operating expense, and such depreciation fund is not used to keep the plant in its proper condition, but is paid in dividends to the stockholders, it is practically equivalent to the payment of dividends out of capital. Rates of service should be such as to include a reasonable charge for depreciation, and if the rates are such as to do this, and the amount necessary to cover depreciation is not used as it should be, it cannot mean anything other than that the money, either in surplus or dividends, is going to the stockholders instead of being used for the purpose intended.

An allowance for depreciation obligates the company to the use of this money in keeping the plant in thorough operating condition, and if it is not so used, but is turned over to the stockholders, it simply means that a part of their capital is being returned to them, thereby reducing the investment in the plant. If this is the case, as a matter of fact, the investment is so reduced, and there should be corresponding reduction made in the actual investment presumably represented by the original or cost of reproduction, new. In such instances, if the owners of the property, instead of keeping up the plant as they should by the proper use of the annual depreciation charge, have appropriated for their own use the money contributed by their customers, the annual depreciation should each year be deducted from the valuation of the plant which might otherwise be obtained.

Depreciation, like interest, continues constantly and is always present. As every part of the physical property of any system, exclusive of the land, begins to depreciate when the plant is completed and ready for operation; therefore, the depreciation charge should be constant. It, of course, may be that such depreciation covering a number of years may be arrived at as an average for a long period, and it will not be necessary to expend the average each year; but this is of minor importance, however, providing the methods by which the depreciation charges are obtained are sound and reasonable.

Two methods are in common use for determining depreciation. The first is known as the straight line method, which involves deter-

mining the probable ultimate life of each element of the system, consideration also being given to the value of the discarded element as junk at the end of the period. In the straight line method it is assumed that, during the entire life of each element of the plant, the depreciation is uniform, which, of course, is not ordinarily the case, as the depreciation of a plant as a whole is much more rapid during the latter part of its life than during the first years of its use. Fairness to customers, however, in the different years, as well as safety to investors, indicates clearly the wisdom and correctness of considering the depreciation uniform throughout the entire life of each portion of the plant.

The second method of determining depreciation is upon the assumption that each year an amount is to be set aside and invested at compound interest so that this amount, plus interest, will be available to cover the cost of the replacement needed at the end of the period when the device or element is discarded, and replacement necessary. The so-called rates of depreciation will naturally be less in the latter method than in the former, since it is assumed that the depreciation fund will earn interest from the end of the first year or even shorter period. If we consider the life of some portions of a plant to be between 20 and 30 years, with the latter method it is necessary for us to in advance assume an interest rate which will continue during this entire period, and this is an assumption which, judged by the last 25 year period, is hardly justifiable.

It may very properly be said that neither method exactly corresponds to actual experience. At the same time the rate of depreciation is something that must be carefully estimated for each individual plant, the data required being compiled from the best information obtainable from those who have been in charge of construction and operation preferably for a number of years. If new devices are constantly being perfected and introduced, rates of depreciation will be high, due to the fact that older apparatus will become obsolete and inadequate at an early date. On the other hand, if the different portions of the plant are not subject to change, as a result of improved or modified methods of manufacture or distribution, rates of depreciation will be low, providing, of course, that wear-and-tear and ordinary deterioration are not severe with a reasonable expenditure for ordinary replacement and maintenance.

Intangible Elements of Value.—In determining the proper valuation, therefore, the original cost, cost of reproduction, new, and present value as affected by depreciation should all be taken into consideration. They are not the only elements, however, although they are usually the most readily determined. One element of value often suggested is that of "goodwill." The goodwill of a business is an asset that cannot be ignored in determining the valuation of a property, provided the element of goodwill is inherent in the business of a public service corporation which may have a practical monopoly. One of the most comprehensive and generally accepted definitions of goodwill is by Judge Story:

"Goodwill may properly enough be described to be the advantage or benefit which is acquired by an establishment, beyond the mere value of the capital stock, funds, or property employed therein, in consequence of the general public patronage and encouragement which it receives from constant or habitual customers, on account of its local position or common celebrity or reputation for skill, affluence, punctuality, or from other accidental circumstances or necessities, or even from ancient partialities or prejudices."

Judge Hough must have had this definition of goodwill in mind in the case of "Consolidated Gas Company *vs.* the City of New York," in which he says:

"There is nothing in the nature of the business enabling it to acquire goodwill in the property sense, or indeed in any other. It is required by law to furnish gas to all demanding it within a certain distance of the mains; and it owns the mains, service pipes and meters. What induces a customer to remain with this company, its successor or vendee? Nothing that I can imagine, except a desire to avoid the nuisance of street digging in front of his house; a digging, however, entailing no expense upon him. Yet even this nuisance is in all human probability impossible of occurrence because of the beneficially monopolistic character of defendant's present occupancy of the streets of this city * * *. Finally, this claim of goodwill seems to forget that for many years the price of distribution of complainant's gas has been regulated by law. A citizen is entitled to have a clean street before his house because he pays taxes, *inter alia*, for that purpose. He is much more entitled to have complainant's gas in his house because the company must give it to him if he pays for it. I think it apparent that the conceivable goodwill of a gas company in this city is about equal to that of the street cleaning department of the municipal government."

The public service corporation operating where competition exists may have an element of goodwill in its valuation, but it is certainly of little, if any, consequence where the public under any circumstances must obtain its service, if at all, from a single corporation.

In a somewhat similar manner may the assumed value of franchises be considered in determining the valuation of the property of a public service corporation. Based upon court decisions, the principal element in the value of a franchise is the earning capacity of the property of the corporation in connection with which a franchise is necessary. Viewed from this standpoint, since the earnings must be directly dependent upon the rates charged for service, it is evident that, to include the value of a franchise as an element in determining rates, develops an almost impossible situation. A franchise which is not exclusive can have no real value from any standpoint, and is in reality little more than a permit to carry on the business and to do necessary work upon public property. As an element of value, even in the sale or transfer of the property, it is questionable whether such a franchise would be given serious consideration. If, however, a franchise is exclusive and is owned by a company, it may be considered of value and would be rightfully considered a part of the entire system if the business were sold. On this assumption it is proper to consider a franchise as a part of the taxable property of the company. On the other hand, while there may be some cases where the valuation of a property may rightfully include a certain sum as the value of the franchise, yet when this value must depend upon the rates for which service is rendered, it is difficult to see how it should be considered as a part of such valuation.

There is an element of value that must be taken into consideration in determining the valuation of a property and which is sometimes referred to as "going value." This is sometimes covered by an allowance, usually in percentage, to cover the difference between the *cost* of the physical property and the *value* of the completed system in operation, providing service to its customers and possessing numerous valuable contracts for giving service in the future. Going value is of an intangible character and may be estimated in some instances by estimating the cost of developing the business which the company enjoys at any particular time. The data naturally is rarely obtainable to indicate the money actually spent by the company to obtain its business, since in recent years the period of time during which public service corporations have been ready for operation and yet not actually engaged in providing service, approximately at least up to their normal capacity, has naturally not exceeded one or two years. When the earnings of a public service corporation have not been sufficient to meet reasonable expenditures for the development of its business and to cover operating expenses, depreciation and a reasonable return on the investment, the losses incurred in building up the business must be considered as one of the elements to be included in appraising a plant for the purpose of determining the proper rates for service.

Probably the most concise statement in this connection is from the language of Justice Brower in a most noteworthy decision in the case of the "National Water Works Company *vs.* Kansas City," in connection with the valuation of a water works which had been taken by the municipality:

"The original cost of the construction cannot control, for 'original cost' and 'present value' are not equivalent terms. Nor would the mere cost of reproducing the water works plant be a fair cost, because that does not take into account the value which flows from the established connections between the pipes and the building of the city. It is obvious that the mere cost of purchasing the land, constructing the buildings, putting in the machinery, and laying the pipes in the streets—in other words, the cost of reproduction—does not give the value of the property as it is to-day. A completed system of water works, such as the company has, without a single connection between the pipes in the streets and the buildings of the city, would be a property of much less value than that system connected, as it is, with so many buildings, and earning, in consequence thereof, the money which it does earn. The fact that it is a system in operation, not only with a capacity to supply the city, but actually supplying many buildings in the city—not only with a capacity to earn, but actually earning—makes it true that 'the fair and equitable value' is something in excess of the cost of reproduction."

In general it may be said that the courts have with few exceptions

held that going value is an important and valuable consideration in determining a fair valuation for the property of a public service corporation devoted to public service. The difficulty, however, is in obtaining a fair and proper figure in any given case. Competition may at any time seriously affect any estimate which may be made of the probable value of a going concern, as contrasted with the physical plant without customers or contracts. It is probably most satisfactory to treat this matter primarily from the standpoint of the excess value of the completed system in operation over and above the original cost, cost of reproduction, new, or cost of reproduction less depreciation, of the physical plant.

If this is done, however, such excess value of the completed operating system must be considered entirely separate from a percentage which may properly be considered as approximately the contractor's profit, who undertakes to design, build and supervise the complete construction of an entire system, turning it over ready for operation to its owners.

The true value of a thing has been defined as the price upon which a purchaser and a seller mutually agree and at which figure an actual transaction takes place. If an existing plant and system were to be purchased, and the owners were willing to sell at all, they would surely take into consideration what it would cost the purchaser to duplicate, not only the physical plant, but obtain all the business enjoyed by them, and the prospective purchasers would surely consider what it would cost them independently to install a plant of equal general efficiency and usefulness, including the business developed and under control of the prospective sellers. In the long run, the true value must be the capitalization of an assured income. A certain portion of this value is represented by tangible property, and the remainder, if there be any, must be regarded as primarily traceable to the earning power of the business.

Gross Revenue, Cost of Operation and Quantity of Gas Manufactured and Sold.—Gas being a commodity, it is manufactured, distributed and sold to those who use it. As manufactured and sold it is divided into units which are usually 1,000 cubic feet. The operating expenses may be properly divided into manufacturing, including fuel, distribution, general expenses, taxes and licenses and depreciation. For any period the unit cost may in a general way be obtained by dividing the total expense by the total quantity sold, and the average cost per 1,000 cubic feet is thereby obtained. Similarly, the unit cost for fuel and other station costs, for distribution, taxes and licenses, depreciation and general expenses, may also be determined. It is of importance also to know the relation between the total gas made and delivered to the holders and the quantity actually sold as per customers' meters. In this manner definite data is obtained for the leakage and the reduction in volume of the gas as measured by the station meters and by customers' meters.

The operating expenses can be definitely divided under two heads, fixed and variable. The fixed costs should include all expenses that are independent of the quantity of gas made, but which remain practically constant whether the plant is operated at or near its full output, or at a fraction of this. Variable expenses include those costs that vary with the output and may be considered as of little consequence if gas is not made. Naturally, these two classes of costs are independent and may vary widely.

It is not always possible to make a definite segregation of these fixed and variable expenses, but when necessary, approximate subdivisions may be made of expenditures involving both. The cost of manufacture per 1,000 cubic feet depends largely upon the total amount of gas made, decreasing as the volume of production increases and increasing as the quantity made decreases, and a slight reduction in the sales will materially increase the cost of manufacture per 1,000 cubic feet. The greater the sales the smaller is the cost of manufacture, but not in the same proportion for the total cost of service, when we include the distribution to customers' meters, and it is, therefore, of the greatest importance in discussing the rates for which gas may be sold to clearly distinguish between the cost of gas in the holder and when delivered to the customers' premises.

In general, it may be said that very large consumers involve a smaller cost per 1,000 cubic feet than small consumers. The question naturally arises, should this difference in the cost of service to various classes of consumers be taken into consideration in determining the proper rates for service? The same rate for all is a term that is often much more beautiful in the abstract than when absolutely applied. Sometimes such a policy, when it means the same rate for all regardless of both cost and the effect upon the growth of the business, is a violation of sound business principles and decidedly against public policy. Often, uniform rates for a very large territory with the same class of customers may fulfill all requirements, but it does not follow that the best interests of all concerned are conserved where, in deciding upon a rate, it is made uniform for every customer. Very closely related to the fixed and variable expenses are capacity and output expenses, and in some respects these more clearly define the costs involved in the two classes of expenditures. There is a term, known as "Consumer's charge," which may ordinarily be included as a part of the fixed costs of operation, and such expenses are directly proportional to the number of cosnumers taking service.

These considerations usually lead to the establishment of what is known as minimum rates or a minimum bill, which should be high enough to cover the cost to the company of the consumer independent of the quantity of gas which may be delivered to and used by him. Many times the actual consumption of gas for small customers is not a great factor in the cost of rendering service, and from this standpoint the establishment of minimum rates would seem to be sound and thoroughly justifiable.

While no rates should be greater than the value of the service rendered, it is not necessarily equitable to charge the same rates to all, regardless of the actual cost, and, as the cost of manufacture per 1,000 cubic feet depends very largely upon the magnitude of the output, such a policy might not only tend to discourage large consumption, but to actually increase the cost to small consumers. It may even happen that large quantities of gas should be sold at even less than enough to yield the regular rate of return rather than these quantities should not be sold at all.

This phase of the situation is often entirely neglected, not only by gas companies, but by those responsible for the adjustment of rates on an equitable basis. Failure to consider such opportunities often results in losses of great magnitude, and thereby results in increased cost to all consumers. A wise and farseeing management having all the information available, can usually treat such matters most effectively by taking into consideration the location of such large customers and the character and magnitude of service required.

In this connection it is of interest to discuss the advisability of charging a higher rate for gas when used for lighting purposes than when used for heating and cooking. As a matter of fact by far the largest part of the consumption of gas is for purposes other than lighting, and this probably accounts for the fact that the rates for the two classes of service differ. In addition there is, of course, the fact that the use of gas for lighting concentrates the maximum demand somewhat similar to, although of less magnitude than, the use of electricity for lighting. Gas is stored in the holder with little additional cost as compared with the storage of electricity, so that the peak load character of the demand is decidedly of smaller consequence as regards the maximum capacity of the plant, than in the generation and consumption of electrical energy. Whether used for lighting or fuel on the customers' premises the gas is used in the same way and from the same service pipes, and unless there is a very great difference in the magnitude of consumption in the two cases it is difficult to see wherein lies the difference in the cost of service in the two instances.

Rate of Return on Investment.—What is an adequate return on the investment for a public utility corporation is a question that has been given the greatest consideration, not only by the courts of the country, but by federal, State, municipal and other commissions. In the U. S. Supreme Court decision, in the New York Consolidated Gas Company's case, it is stated that:

"There is no particular rate of compensation which must in all cases and in all parts of the country be regarded as sufficient for capital invested in business enterprises. Such compensation must depend greatly upon circumstances and locality; among other things, the amount of risk in the business is a most important factor as well as the locality where the business is conducted and the rate expected, and usually realized there upon investments of a somewhat similar nature with regard to the risk attending them."

In considering such a matter it is evident that, under present industrial conditions, the best interests of society as a whole are subserved when the share of each factor of production is high enough to cause a free and natural distribution of capital and business ability as well as labor into all utilities. When wages and the returns on investment are not high enough to be attractive then in such a utility there must be a decline. No utility will be furnished unless the factors making such a utility attractive are present. Wages must be high enough to attract competent workmen, salaries sufficient to engage successful superintendents and managers, interest on the capital

legitimately invested must be earned, and, in general, the return must be high enough to induce investors to assume all risks and responsibilities that are involved in their operation. From this it naturally follows that the rate fixed for service rendered by public utility corporations must in the long run be high enough to attract all of the elements necessary for the production of that service, taking into consideration the wages to be paid, the cost of superintendence and management, the interest on the investment, and a reward for the risk and responsibility entailed.

Unfortunately, however, many who have been most active in the development of public utility corporations in recent years have been interested therein primarily from the speculative standpoint rather than as legitimate investors. Speculation necessarily involves risk. An investment is generally considered reasonably safe. A high rate of return rarely compensates when there is a danger of losing a part or all of the principal. Customers of a public service corporation have a right to demand that the rates they pay for service shall be only adequate to give a proper return upon the necessary investment required, and not so high as to make the return, upon a reasonably safe investment, of the magnitude usually demanded in a pure and unadulterated speculative venture.

The tendency toward legislation affecting public utilities, the creation of wise and powerful commissions and the enactment of numerous laws, not only regulating, but actually protecting public service corporations, constitute a definite reduction in the risks and hazards formerly existing in many instances.

In public utilities capital cannot be turned over as frequently as in commercial enterprises, due to the relatively large proportion of the fixed investment. Legislative regulation of public utilities through commissions may, in some respects, be detrimental to financial operators who endeavor to evade their obligations under the common law, and who try to profit by the manipulation of capital rather than through legitimate, effective and economical operation of their plants. Such regulation, however, cannot possibly result in permanent injury to the great majority of investors, and to the utilities themselves if honestly applied and administered with ordinary care. An investment along the lines of, and in the spirit of, such laws as those which have been upheld by the courts assures, in every case, a reasonable return on a fair valuation of the plant.

While public utilities are subject to many conditions that tend to increase the risks under which their business is carried on, they are also afforded a great deal of protection that is of the greatest value to investors. Many are natural monopolies engaged in furnishing service that has practically become a necessity, and for which, at least at the present time, there are no effective substitutes. An investment in a public utility corporation wisely directed, while involving a greater risk than if the same money was placed in good mortgages, should not involve hazards equal to investments in ordinary competitive enterprises.

The profits of a business consist of the balance between the sum of expenses and the total income of the business. It is the difference between the sum representing the operating expense, which includes rent, salaries and wages, fuel, taxes, interest, depreciation, and the total gross revenue. This difference is the last share of the total income, and, unlike all the other shares, is not fixed. It simply consists of what is left after all other claims have been completely satisfied. Salaries, wages, rents and interest are usually fixed at a certain amount per annum in advance and are paid out of the gross receipts. The amount left after these shares have been satisfied belongs to the owner and represents his share of the profits of the business. Interest and profits, notwithstanding the indeterminate quality of the latter, are usually measured upon the same basis, and are included in what is generally known as the adequate return on the investment.

The difference between the gross revenue and the aggregate of the legitimate operating expenses for a single year is the sum usually considered as the net revenue or return upon the investment. As the gross revenue and the operating expenses are for many reasons subject to wide variations, it is manifestly unsafe to determine rates upon a single year's business. A most valuable method is to consider the gross and net return per dollar invested for a number of years of operation. By doing this the additional investment in the plant from year-to-year, as well as the growth of the business, both from the standpoint of gross revenue and operating expenses, is obtained. In fact, many important conditions affecting the company are brought to light in such an analysis.

The value of ascertaining how much a dollar earns, both gross and net, is due to the important differences between public service corporation and ordinary commercial enterprises. In most private undertakings the operating expenses can usually be greatly reduced or even practically eliminated if for any reason the gross receipts are reduced so as to make the business unprofitable. But this cannot be done in the case of public service corporations, who must under the law provide service to all within the territory covered by the distribution system provided who request it. While the investment in the private enterprise may be greatly restricted or even withdrawn, such is not the case with a public service corporation. The relatively large investment in plant, equipment and other property of the public service corporation means that the interest and other fixed charges go on at about the same rate whether the plant is operated and its output sold or not. As a result, the public service corporation is compelled under certain adverse condition to keep its plant in operation, even if the actual operating expenses are greater than the gross receipts.

A complete investigation of all conditions existing for a number of years is, therefore, of much greater value than confining the data upon which rates are fixed to a single year's business. The public service corporation should not be a free agent to do absolutely as it pleases, and on account of this restriction certain reasonable protection is desirable for all concerned. Free and unrestricted competition between private enterprises may be of the greatest benefit to the public. Experience shows, however, that this is not the case with public service corporation where the commodity furnished by them is a necessity and the character of the business such as to be a natural monopoly. Competition in such cases inevitably results in a bitter struggle for supremacy and rates, so low as to be inadequate, to maintain the proper quality of service and yield a return sufficient to make extensions commensurate with the growth of the community. Two or more distinct and separate corporations providing the same public commodity are not likely to remain separate very long. Sooner or later it will be self-evident that the service rendered by them independently can be more cheaply, effectively and in a better manner provided by a single operating system under one management. As a result it is an invariable rule that competition which is often thought to be preventive of excessive rates becomes ultimately the direct cause of what is relatively an extortionate rate of service, when compared with what the rate should be if destructive and temporary competition is prevented and the rates equitably fixed under proper control by a wise commission.

Again, a modification of rates at frequent intervals is undesirable, as it renders unstable and, therefore, the more hazardous, the entire business of rendering service. Everything of every character tending to eliminate uncertainties and general risks on the one hand, and which provides protection and wise regulation on the other, definitely increases the security of the investment, the required return upon which is thereby reduced, the general stability of the enterprise is materially improved, resulting not only in reduced rates but improved quality of service.

Conversely, the rate of return on the investment, and consequently the rates of service, must be correspondingly high as long as unrestricted competition threatens, and extraordinary risks involving a possible loss of a large fraction of the investment confront, those interested in the progress and development of public service corporations in general.

In the end, all costs of every character, such as litigation and other expenses, incident to the establishing of rates, whether paid out of public funds or by the public service corporation, come out of the consumers' pockets, as taxpayers in one instance and as consumers forced to pay the company for service in the other. The constant danger to the company of having its investment as well as its gross revenue seriously impaired, due to the fixing of rates upon other than a sound and equitable basis, involves that much extra hazard in conducting its business, necessarily requires an increased return upon the investment on account of such menace, and in turn will ultimately result in rates higher than they should be.

The Proposed Consolidation of the Danvers and Beverly Lighting Companies.

The text of a characteristic decision recently reached by the Massachusetts Board of Gas and Electric Light Commissioners, in the matter of the petition of the respective proprietors of the Danvers Gas Light Company and the Beverly Gas and Electric Company, is appended:

This is a joint application by the Beverly Gas and Electric Company and the Danvers Gas Light Company for the determinations relative to their consolidation under the name of "Beverly Gas and Electric Company," required by the provisions of chapter 529 of the Acts of 1908, as amended by chapter 316 of the Acts of 1909.

(*Continued on page 266.*)

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NEW YORK, MONDAY, OCTOBER 23, 1911.

[Special Editorial Correspondence by Telegraph.]

SIXTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

HOTEL JEFFERSON, ST. LOUIS, MO., October 18, 1911.

Dear JOURNAL: The invasion by the gas men of this time honored city seems to have been properly made and with effectiveness. At any rate the New York-Philadelphia contingent (and a numerically strong one it was) arrived in good order, after a trip that will long be remembered by those who made it for its cordial fraternality. Reaching here the evening of yesterday, the wayfarers were received with open arms—perhaps if I said that we were at once put into taxicabs and other modern types of conveyance, and escorted to our respective quarters, would be closer to expressing the actual condition. Chairman Holman, and his many aides, efficient, active and resourceful, were here, there and everywhere, and anyone who failed to receive the first aid to the traveller, on his arrival in a city other than his own, at the hands of the Committee, must have been a laggard indeed. Headquarters in the beautiful Hotel Jefferson last night looked (and was) a busy place, quite 250 numbering the advance guard. Fraternal re-unitings with the usual concomitants were continuous, and generally good atmospheric conditions contributed much to the vivacity and enjoyment of the occasion. Bidding these preliminary features of the convention good-bye, and moving from headquarters over to the meeting place proper (the Art Museum Building, 19th and Locust streets), let me give you some account of the actual transactings at the first day's session. The meeting was called to order at 10 A.M., by President Donald MacDonald, of Louisville, Ky., with Mr. A. B. Beadle in the post of Secretary. Meanwhile it might be well to note that a special scheme for the exterior illumination of the Art Museum had been carried out. Exteriorly the Welsbach Company had placed 21 "ornate" posts, each carrying high candle power lamps, the lines of illumination stretching along the curb front, and on one side-street boundary of the Hall. Along the coping of roof and on the roof top as well were placed sixty 5-burner arcs of the Humphrey type, well spaced, and the interior of the Hall was illuminated by a Humphrey arc. The effect of it all was excellent, and afforded positive evidence that electric arcs of any type were more than matched for the purposes concerned. I might also here add that the Hotel Jefferson, as to its exterior, was a decidedly bright spot, made so by the clever, appropriate placing of Humphrey 5-burner arcs, to the number of 34. However, to return to the regular order. The President having announced the formal opening, Mayor F. H. Kreismann welcomed the members to the "freedom of the city," in a speech that savored of unconventionality or prudery. Indeed his verbal message seemed in small need of the backing tendered it by his presentation to the President of a huge and shining metal key with the assurance that it would unlock every door in town. Mr. E. G. Pratt, in responding to the Mayor's welcoming, was as usual eloquent, suave, and convincing that the Mayor's speech was meant and that he would be taken at its full acceptance. The routine business included the introducing of the new members who had been placed on the rolls during the year—128 were admitted, thus bringing the total to 1,383. The report having been submitted and adopted, and owing to the absence of both Vice-Presidents, Mr. Henry L. Doherty was called to the Chair, while President McDonald read the annual message. Rather than pass upon any of its suggestions here, I prefer to let your readers draw their own conclusions thereon, when the document itself and the report of the Committee appointed to consider its determinings (Messrs. Lathrop, Baehr and Dunbar) are laid before them. The report of the Nominating Committee showed that rumor had it true when, some weeks ago, it was said by many that Mr. Beadle would not consent to a re-election. The gentlemen recommended by the Committee to hold office for the ensuing year (of course, they were a trifle later on declared elected), were:

For President.—Ira A. Copley, Aurora, Ills.
" *First Vice-President.*—V. F. Dewey, Grand Rapids, Mich.
" *Second Vice-President.*—E. N. Wrightington, Boston, Mass.
" *Secretary and Treasurer.*—George G. Ramsdell, N. Y. City.
Directors (to serve 2 years).—C. L. Holman, George McLean, A. S. Miller, Rollin Norris and R. E. Slade.

All voiced great regret at Mr. Beadle's determination to relinquish the post; but he has the satisfaction of taking with him into his voluntary retirement the certain knowledge that his work on the Institute's behalf, in times that were not only the beginning times, but fraught with the initial continuing work as well, is appreciated to the full. In turn the Institute well knows in Mr. Beadle's successor (Mr. George G. Ramsdell) it possesses a man completely up to carrying along the work of the body in resolute, unswerving, masterful way. That his naming was popular was well attested by the acclaim with which that naming was received.

President-elect Copley's business-like acknowledgment seemed to accord with the views of those who elected him, and a like remark aplies to "Vic." Dewey's acceptance. Mr. Wrightington was not present. The first paper read was that by Mr. L. R. Dutton on "Costs of Results Obtained from Automobile Delivery." His handling of this subject, together with the thoughts put forward in the discussion, shows that this method of transportation is certain to figure largely in gas works' practice. An adjournment was now ordered.

The afternoon session was convened at 2. For the purpose of facilitating the regular order, two sessions were held. In "Part 1" engineering matters were taken up, while in "Part 2" distribution topics were considered. Part 1 was conducted under the direction of the President, and the first subject considered was that treated by Mr. L. E. Worthing, whose narrative concerned "Some Principles of Condensation with Especial Reference to Water Gas." This interesting communication was followed by a symposium article on the "Production and Market for Ammonia Products." It was treated in four sections, the technical features thereof being admirably, respectively, presented by Messrs. Atwater and Fisher, while the production and marketing of the article, and the bibliography as well were well put forth by the efforts of Messrs. McIlravy and Way. The closing numbers in Part 1 were those submitted on behalf of the "Wrinkle Department" (A. P. Traver, Editor) and the "Bureau of Information." In Part 2 the proceedings were capably directed by Mr. W. Cullen Morris (First Vice-President) whose direction of affairs recalled to many of his hearers the famous meeting in Astoria last summer, of the New York Society of Gas Engineers. The initial subject was the "Report on Electrolysis, United States Bureau of Standards," prepared by Mr. S. W. Stratton. His excellent *resumé* of the situation in this respect well merited the attention that it received. Next came the statement, by Mr. J. D. von Maur, respecting "Actual Leakage in Unaccounted-for Gas," the outlinings in which caused some of those not over precise in the running of their business relations with the public quite some "food for thought." Of course, the scholarly putting forth of the subject of "The Flow of Gas in Mains," from the studies of Mr. J. W. Battin, was most acceptable. The author is of a verity a close observer. Then followed a brief, pithy discussion of matters connected with the distribution topics that had been handed to the Editors of the "Wrinkle," "Bureau of Information" and "Question Box" divisions. There were no set plans for entertainment during the evening but that there was lack of opportunity to enjoy the evening was not discernible. In fact, Chairman Holman and his Committeemen were indefatigable and thoroughly successful in their plannings for the complete entertainment of the great number—over 300 are present—in attendance. I should here say that the especial thanks of many are due to Secretary Hatton for his excellent managing.

FRIDAY MORNING, the 20th.

To my budget of yesterday I should have added that the report of the Trustees of the Gas Educational Fund showed that the realization of the best hopes of the founders and subscribers to this fund were being more than realized. Also that the Beal medal, for the years 1909 and 1910, was awarded, respectively, to Mr. C. J. Ramsburg, United Gas Improvement Company, Philadelphia, Pa., for his paper on "Sulphur Compounds in Illuminating Gas," and to Mr. H. W. Alrich, of the Consolidated Gas Company, of New York, for his notes on "Brick, Concrete and Steel Holder Tanks." The formal awarding was made on behalf of the Committee by ex-President A. C. Humphreys. The weather to-day was quite warm (the thermometer at one time pointed 80°), but there is no lack of go to the proceedings. The section plan was again followed, with splendid results. "Part 1," again under the direction of the President, was ready for business when that chief official introduced Mr. Carroll Miller, whose precise paragraphs on the "Operation of Verticals at Providence, R. I.," were followed by the reading of Mr. W. G. Africa's concise "Report on Verticals at Manchester, N. H." This enabled a joint discussion, which was rendered all the more illuminative by the ready wit of the "Man from Providence." Mr. W. S. Blauvelt, whose analytic mind and painstaking ways have put him in the very first rank of engineers conversant with advanced coke oven practice, then read a series of valuable "Notes on the Development of a Coke Oven Plant." That the subject is close to the thought of present day gas engineers, was completely attested by the nature and trend of the discussion that followed the Blauvelt communication. At this point the Committee on Next Place of Meeting reported in favor of Atlantic City, which recommendation went through with a cheer. Mr. C. O. Bond, of Philadelphia, whose fame as a photometrist now extends to every part of the world where illuminating gas is known, here read his "Survey of American Gas Photometry." The communication will for many a day be one of the best studied treatises that has a place on the everyday bookshelves of gas engineers, not only in America but elsewhere. Nice sequels to Mr. Bond's chapters were the reports (read by Dr. A. C. Humphreys) of the "Thermal Unit Value and Candle Power Committee," and of the Committee on Calorimetry," Mr. J. B. Klumpp, Chairman. Again did the discussion thereon reveal the fact that the time when the royal battle between candle power and calorimitry would occur was close to the day's practice. In Part 2, the regular order was: "The Turbo-Blower," well handled by Dr. L. C. Lowenstein, and "District Holders," by Mr. R. C. Griswold, of Denver. These were jointly discussed, and at quite some length. The session was closed with an interesting presentation by Mr. A. D. Whittaker (Atlanta, Ga.) of the subject of "Tar Distillation and Market for Its Bye-Products." After luncheon, Prof. W. A. Bone, University of Leeds, England, delivered a magnificent lecture on "Surface Combustion." The theme of the discourse and its handling were in line with his prior lectures on this topic earlier in the year before the Royal British Institution, and the British Gas Institute. It is needless to say that his sustained theorizing and practical deductions, brought out, all the more vividly, by practical experimentation in direct view of his audience, which crowded every inch of space in the Hall, were followed with the closest attention. This completed the actual technical work, although up to now one paper (that by Mr. John A. Britton, of San Francisco), remains unconsidered because of the very regrettable absence of the author.

The banquet (400 partook of it), and a banquet it really was, was ushered in, just as the guests were seated, by a rush of many newsboys, who busied themselves distributing a 4-page news sheet, yclept "The Evening Flicker." It bristled with pokes at the gas men, old and young, tall and small, fat and flat—none escaped its coking. The festivities were directed by Mr. Eugene H. Angert, a noted St. Louis barrister, who, you may rely on it, was in every best sense "on the job." The menu card was unique, in that it was a faithful reproduction of a gasholder, and all the appointments were simply perfect. The speakers included Mayor Kriesmann, Prof. Bone (he speaks as well as he lectures) and Mr. W. M. Reedy, of the St. Louis *Mirror*. But if I attempt to go on with the list, you will have to print a supplement. The adjournment was declared at a "perfectly seasonable hour." All Friday will be given over to pleasuring—unless something in the line of "unfinished business" crops out. That will be taken up by means of an 8-hour trip on the Mississippi river, per steamer "Alton," with luncheon served on board. But as this trip includes many features, the portrayal or narrating thereof will have to go over until we reach Denver next week; for I well remember that Friday is the Devil's day with you—of course, I mean "press day." In closing let me note that these firms have creditable displays of their goods which are tastefully set up in the lobby of the Jefferson: The Mueller Manufacturing Company; the Connelly-Iron Sponge and Governor Company—President Hayward distributed fancy coin holders early in the week, and some are hoping that he will fill them *manana;* the Central Foundry Company (a display of pipe), and one or two other exhibits. One of the very ranking members of the Committee on Entertainment wishes me to especially note that one of those present at the banquet was Rev. Dr. W. C. Bitting, of the Baptist Church. Another thing over which the Committee of Arrangements is to be heartily congratulated is the excellent book of "Information and Entertainment" gotten up for the guidance of the visitors. It is absolutely complete. With this despatch ends your preliminary account of the sessions, the story about which will be completed while speeding to the Denver meeting of the National Commercial next week. If signs count for aught, that session will at least equal any of its preceding conventions.—W.

CURRENT MENTION—

MR. J. FRED. SEAMON, for a score years actively in the profession, 10 years of which were spent in the engineering and managing branches of the gas industry, the remaining half of the score having been devoted to field work in the construction division of the United Gas Improvement Company, has accepted the position of Engineer to the Tampa (Fla.) Gas Company. His active work in the new field will begin at once, and in it he will find plenty to do. While not in any sense either attempting or wishing to belittle the work of those heretofore in charge of the development of the Tampa Company, it may nevertheless not be gainsaid that its direction, particularly in respect of the executive division of the business, has been of the decidedly conservative sort, such comment will not be a possibility in short order. This we believe from our knowledge of the methods heretofore followed by those who now control the plant. They are men of affairs in the industry, and are not to be charged with indifference to instituting ways and means that, while serving the public to good advantage, bring them substantial reward for their alertness and persisting endeavors. Given this opportunity to show that which is within him, we make no donbt that Mr. Seamon will add to his reputation by guarding zealously and connectedly the interests delegated to his supervision. The new proprietors are proposing to expend forthwith in the Tampa plant a sum that will mount well up in the six figure column. Personally we wish that Mr. Seamon will have success in his far Southern field of duty, and congratulate his employers on having secured the service of a competent man, whose crowning worth is loyalty to those whose interests are in any measure or way committed to his custody.

ALDERMAN PRINGLE, former Chairman of the Chicago Councils' Committee on "Gas, Oil and Electric Light," at a recently convened meeting of the Chicago Association of Commerce, through its Committee on Ways and Means, advocated the elimination of public utilities from the field of politics. In his address to the Association Alderman Pringle, among other things said: "Chicago needs a permanent commission of *experts*, with ample power to deal with the question of rate making. The commission should be free from all local and political influences. * * * Public utilities are natural monoplies. There should be neither competition nor repression in their trading, and they would court rather than decline a watchful supervision of their acts." Well said.

THE authorities of Sarnia, Canada, and the proprietors of the Sarnia Gas and Electric Light Company have decided to submit the question of the purchase of the Company's plant to arbitration. The town has appointed one member of the Board and the Company has named a second member. They are to choose a third member, or failing to come to an agreement thereon the third member will be named by Judge McWatt, senior County Judge, of Lambton county.

MR. NORMAN G. KENAN, former President of the Union Gas and Electric Company, of Cincinnati, O., arrived in this city recently, per steamer "Cleveland." He was accompanied by his wife. The return is the termination of a long trip spent in journeying abroad.

MR. LOUIS J. CARDER, Engineer of Distribution to the Tramways, Light and Power Company, of Rio de Janeiro, Brazil, arrived in New York last week. Mr. Carder, who is accompanied by his wife, will remain in the States until well into January next.

AN announcement has been received by us from the Brown Hoisting Machinery Company, of Cleveland, O., detailing the opening of its Pacific Coast headquarters. These are in the Monadnock Building, San Francisco, Cal., and are under the management of Mr. J. P. Case.

THE last meeting of the "Society of Chemical Industry," New York Section, which was held the evening of last Friday in Rumford Hall, was more than usually interesting from the nature of the subjects considered. Three numbers were on the list, and of these (which is in no sense belittling to those not specifically named) the illustrated lecture, by Mr. Howard Lyon, on "The Manufacture and Performances of the Edison Storage Battery," was enthusiastically received. And "enthusiastically" is used in its literal sense, strange as enthusiasm may seem during the usually serene sessions of this sterling body. Chairman Whitaker, of the faculty of Columbia University, and well remembered of gas men, and that other well-loved gas scientist, Dr. E. G. Love, are to be congratulated in respect of their service to the lighting industry through the frequent recognition by the Society of topics germane to their art.

THE first regular meeting of the Philadelphia Section, Illuminating Society, was held in the Assembly Room, Philadelphia, the evening of Friday last. A large attendance assembled to listen to, and actually witness, a thoroughly practical paper (or discourse) on "Training Commercial Men in the Fundamentals of Illumination," by Prof. Sidney Ashe, of the Harrison (N. J.) staff of the General Electric Company. The presentation was much bettered by the frequent use of well-prepared and intelligently placed experiments, amplified and simplified by many artistic and well-thrown lantern slides. The mental proceeding was well disposed by an excellent dinner, nicely served, in Mosebach's up-to-date Market street restaurant.

MR. J. F. DOSTAL, formerly of the Denver (Col.) Gas and Electric Company, has succeeded Mr. George B. Tripp as Manager of the Colorado Springs (Col.) Light, Heat and Power Company. Mr. Tripp goes to Harrisburg, Pa., there to become General Manager of the Harrisburg Light, Heat and Power Company.

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After due notice a public hearing, as required by law, was held on this application. Representatives of the town of Danvers were present and expressed their approval, provided the consolidation did not affect or interfere with the business of their municipal electric light plant.

Accompanying the application, is an agreement of the two companies to consolidate together, with certified transcripts from the records of both companies, from which it appears that the terms of the consolidation have been approved at meetings called for the purpose, by votes of more than two-thirds in interest of each of the contracting parties, adopted within less than 4 months prior to the filing of said application.

The Beverly Company is engaged in making and selling gas in Beverly. It was also duly authorized, in 1888, to engage in the business of supplying electricity in Beverly, and this original authority having been extended by the Legislature to Wenham, Hamilton and Topsfield, it is now supplying electricity in these towns as well as in Beverly. In 1889 it was duly authorized to engage in the business of selling electricity in the town of Danvers, but has never exercised such authority. The town had in the same year established a municipal plant, and this action was legalized by the Legislature in 1891. While in case of consolidation the Beverly Company will acquire whatever rights the Danvers Company now has in view of these facts, yet it will not gain any new or greater rights as against the Danvers municipal plant, and before it can engage in the electricity supply business in Danvers must in any event obtain from the Selectmen locations for its lines in the public streets.

The Danvers Company is engaged in selling gas only in Danvers, a municipality contiguous to Beverly. It was organized under the general law in 1861, with an authorized capital of $20,000, for the purpose of "making and selling gas for light in the town of Danvers." In 1909 its capital was duly increased to $30,000. On June 1, 1911, it owed $7,433.06, and it had a plant with a book value of $49,328.15 and other assets of a book value of $2,348.88. Since the Company began making returns to the Board, in 1885, it has paid dividends in but 5 of the years prior to 1906. In 1906 it paid a dividend of 3 per cent., in the next 3 years 6 per cent. and in the last 2 years 6½ per cent. Since 1903 the Company has been owned or controlled by the same interests controlling the Beverly Company. During the year ending June 30, 1910, it sold 7,068,300 cubic feet of gas, for which it charged a maximum net price of $1.70 per 1,000. In 1906 the mains of the two companies were connected at the Danvers line, and since then the Danvers Company has purchased all of its gas of the Beverly Company.

By the terms of the agreement to consolidate, the Danvers Company is to convey to the Beverly Company "all its franchises, locations, lands, buildings, equipment, moneys, rights, easements, choses in action and other property of whatever nature," and the Beverly Company is to assume and pay all lawful liabilities and obligations of the Danvers Company and to issue and exchange 300 shares, of the par value of $100 each, of the former Company for the 600 outstanding shares, of the par value of $50 each, of the latter Company. When this exchange of stock has been effected, the certificates for the shares of the stock of the Danvers Company are to be surrendered and cancelled and are not to be reissued. By an order simultaneously adopted the Beverly Company has been authorized to issue 300 shares of new capital stock for the purpose of effecting the consolidation. Under this arrangement the aggregate amount of the capital stock and the aggregate amount of the debt of the two companies will not be increased by reason of the consolidation.

As has been previously stated, the two companies for some years past have been physically connected, and for all practical purposes have been operated as one plant. It appeared at the hearing that for some time past there has been complaint of the price charged by the Danvers Company for the gas which it supplies. It was stated, however, that if the consolidation is approved the price of gas in Danvers will be reduced immediately from $1.70 to $1.40 net per 1,000 cubic feet. Even at this price the substantial advantage of the consolidation to consumers of gas in Danvers is obvious. But while the Company undertook to justify a difference in price between Beverly and Danvers, the Board is not satisfied that any sufficient reason exists for a permanent difference in price as between the two municipalities when supplied by the same Company, and that any difference in price should not be a permanent arrangement, but should disappear as the causes upon which it is based are eliminated and the benefits to be derived by the Beverly Company from the increase in its business are more fully realized. The Board further finds that consolidation will bring no disadvantage to the territory already supplied by the Beverly Company, and that the facilities for furnishing and distributing light, heat and power will not be diminished by reason of such consolidation.

Unstable Hydrocarbons in Illuminating Gas.

[Prepared by Mr. E. C. Jones, of San Francisco, for the Nineteenth Meeting, Pacific Coast Gas Association.]

Defining the quality of illuminating gas in terms of candle power served its purpose after a fashion, while gas was used almost exclusively for illumination, and, when over 90 per cent. of all the gas sold was consumed through open flame tips for lighting, there seemed to be no other way to arrive at a tangible value excepting to measure the light emitted by the burner commonly used to burn the gas. This value was expressed in terms of candles, with full knowledge that the light of a candle is as inconstant as the Moon.

Every generation of thinkers in the gas indnstry has sought a reliable and unchangeable unit for the measurement of light, but the standard candle, with its uniform weight and composition, and under normal conditions burning at the rate of 120 grains of its substance each hour, has survived the results of all these efforts.

It is not the purpose of this paper to discuss the wide field of photometry, but to touch on a few points in order to emphasize the importance of some of the experiments with illuminants on which candle power depends, and to plead for a heat unit standard of value. While the candle is nominally the unit of light measurement, yet, to reduce errors, the pentane lamp and other multi-candle power lights are substituted, while in France the Carcel lamp is used, and in Germany the Hefner unit takes the place of the candle; but, whatever light is used as a standard, the results of the findings are invariably expressed in multiples of the good, old, unreliable candle.

Enough for the "constant" end of the bar photometer; and now to consider the variable end, or the gas light to be measured. When the gas was very poor, in the early days of gas, the burners were also poor, but, during successive stages of inventive development, the quality of gas was improved, and the burner through which it was transformed into light was also improved.

The German, lava-tip, argand burner developed more candle power than the crude iron "fishtail" and "batswing" burners, but the work of Sngg produced the standard Argand burners now in universal use in photometry. These burners are made in a series adapted to the requirements of different kinds of gas, and by ingenious contrivances the proper amount of air is supplied for combustion to gas issuing from openings of the right size in the burner. The different burners also require glass chimneys of different diameters and heights to assist combustion.

The Sugg-Argand burner has been accepted as a satisfactory standard for photometric comparison, it having been generally conceded that this burner develops more light measurable as candle power than any other. The only exception to this was the application of the Sugg burner to carbureted water gas, when it was found that an open flame tip, of the Bray type, developed more candle power. Many of the municipal ordinances concerning candle power provide that the gas shall be tested by a burner best adapted to general use for house illumination, which requirement would be filled by the open flame burner better than by the expensive and complicated Sugg-Argand burner with its glass chimney.

Other factors, which affect the art of photometry in its exactness as a science, are the colors of the lights compared, the question of intensity of light, and its diffusion, resulting in the arbitrary adoption by different observers of photometer bars of either 60 or 100 inches in length. The area of the light-emitting flame has much to do with illumination, and it is a question if this is fully appreciated by the reflections of the little grease spot on the Bunsen disk.

The wonderful and revolutionary discoveries by Dr. Carl Auer von Welsbach have changed the aspects of the intrinsic and economic value of gas. Previous to these discoveries the use of gas for cooking, heating and other industrial purposes had steadily increased, utilizing the heat giving qualities of gas, and, to a certain extent, ignoring the highly sensitive portions that constitute its chief value as an illuminant; in fact, the most valuable light giving hydrocarbons often interfere with complete combustion, in appliances designed solely to develop heat from gas.

The advance in the use of gas for heating was accompanied by a wane in the use of gas for lighting. This was caused by many well-

known reasons, amongst which was the lively competition of electric lighting, which, had it not been checked by the incandescent gas light, with its high efficiency and economy, would have obliterated gas from the field of artificial illumination. As it is, however, probably as much as 80 per cent. of all gas sold is used for its heat, while a large portion of the remaining 20 per cent. is used for illumination by the application of the heat of the gas to incandescent mantles, and a very small amount of gas is used for illumination directly through open flame burners. This amount is at present, or is rapidly becoming negligible, for it is difficult to imagine a use for an open flame burner which would not be better served by an incandescent burner, with better light and less cost. And it is for the regulation of this insignificant, and almost obsolete, use of gas, that the candle power is maintained. A little missionary work on the part of gas companies would quickly replace the open flame burner with incandescent burners, by the use of the never failing explanation that the consumer gets three times as much light for half as much money. Once removed from the field, these open flame burners would eliminate the only reason for retaining a candle power standard.

The Welsbach burner utilizes the heat of the gas to raise the temperature of refractory earths to a condition of incandescence, with the result that 5 cubic feet of 20 candle gas converted to heat, and applied to a mantle, yields light to the amount of over 100-candle power; and, when used under high pressure, will develop as much as 70 candles per foot of gas.

To accomplish this end, the air necessary for complete combustion is mixed with the gas in a Bunsen burner, which reduces the illuminating flame to a non-luminous, heating flame, thus destroying all the results obtainable by the refinements of gas making, which produce uniform high candle power, including careful condensing and scrubbing and expensive and sometimes difficult enriching. This same Welsbach burner would technically meet the requirements of a standard burner for photometrical use, and it is undoubtedly the burner best adapted to household illumination, but for obvious reasons it has never been so used.

A quest for a remedy for naphthaline deposits led the writer to experiment with the use of crude petroleum and distillates for scrubbing gas for the removal of naphthaline. This work was begun with some latent prejudice, born of early experience in coal gas making, when it was an axiom of the craft that the finished gas must not be brought in contact with oil, because of the disastrous effects upon the candle power of the gas. This knowledge of the havoc wrought by oil upon the unstable illuminants of coal gas precluded the use of oil in gasholder tanks and seals for the purpose of preventing freezing of the water. This was sane reasoning, because the substitution of crude petroleum for water in a scrubber of the "Standard" type would reduce an 18-candle coal gas to a practically non-luminous gas, and the candle power of coal gas is too expensive and difficult to attain to warrant the sacrificing of any part of it.

The first series of experiments to determine the action of petroleum upon candle power were conducted by passing the gas slowly through a dip scrubber, the gas passing through a sleeve perforated with holes $\frac{3}{32}$ of an inch in diameter, and breaking a seal 1½ inches deep of oil. The gas made one passage through this oil seal, then passed directly to the bar photometer for test. A large sample of gas stored in a test holder was used for this purpose and the candle power of each sample was taken.

California crude petroleum, of 16.50 Beaume, was used for the tests, the oil for scrubbing being heated to different temperatures to try to find out if heating the oil would cause it to remove naphthaline without destroying the candle power of the gas.

The following is from a series of tests made with oil gas and mixtures of oil gas and lamp black water gas:

Number of Tests.	Temperature of Oil Used, Degs. F.	Candle Power before Scrubbing.	Cand'e Power after Scrubbing.	Loss in Candle Power.
1	87	21.3	17.4	3.9
2	100	21.1	16.9	4.2
3	163	20.5	16.9	3.6
4	130	19.4	16.9	2.5
5	130	19.6	17.1	2.5
6	130	17.4	13.5	3.9
7	130	17.4	13.4	4.0
8	130	17.0	12.6	4.4
9	130	17.0	12.7	4.3
10	130	19.0	13.2	5.8
11	120	19.0	13.3	5.7
12	110	19.0	13.3	5.7
13	100	19.0	13.7	5.3

The summary of these 13 tests of gas passing once through oil was:

Highest candle power of gas	before scrubbing	.....	21.3
Lowest " " "	" "	.....	17.0
Highest " " "	after "	.....	17.4
Lowest " " "	" "	.....	12.6
Greatest loss of candle power		.....	5.8
Average " " "	"	.....	4.29

From these results it would seem that even slight contact of illuminating gas with oil causes a loss in candle power, and that the amount of loss is not directly proportional to the temperature of the oil used, provided the temperature of the oil is below the flashpoint. After these experiments it occurred to the writer that partial scrubbing of gas with oil might be resorted to for the purpose of removing naphthaline; but it seemed certain that, thorough scrubbing, with long, intimate contact between the oil and gas, would destroy the candle power. A small, experimental scrubber was made and was filled with wooden trays, nicely fitted, so that neither gas nor oil could by-pass them. This scrubber was constructed for the purpose of slowly scrubbing small quantities of gas in contact with an excessive amount of oil at temperatures ranging from 70° to 160° F. After having been convinced that oil is capable of removing certain hydrocarbons from gas, it was decided to adopt oil as one of the reagents for absorbing these illuminants during the experiments, and a Hempel pipette, filled with crude petroleum of 16.50° B., and used in analyzing the gas immediately following the absorption of carbonic acid gas, and preceding the fuming sulphuric acid pipette, for illuminants. The hydrocarbons thus absorbed by oil are indicated in the following analyses as "Illuminants No. 1," while "Illuminants No. 2" are those absorbed by fuming sulphuric acid after the oil pipette has been used.

Experiment A.

Oil gas 17.9 candle power (large sample in holder).
Carbonic acid gas 2.5 per cent.
Illuminants No. 1 = 1.5 per cent.
Illuminants No. 2 = 4.8 per cent.
} 6.3 per cent. total illuminants.

The gas, at 17.9-candle power, was passed through the oil scrubber, and again tested for candle power, and for illuminants No. 1 (with oil), and illuminants No. 2 with fuming sulphuric acid.

Temperature, Oil, Degs. F.	Candle Power.	Illuminants, No. 1.	Illuminants No. 2.	Total Illuminants, Per Cent.
70	4.1	0.0	4.5	4.5
80	3.1	0.0	4.0	4.0
90	3.8	0.0	4.4	4.4
100	2.4	0.0	4.9	4.9
110	4.3	0.0	4.5	4.5
120	2.6	0.0	3.8	3.8
130	3.5	0.0	4.7	4.7
140	4 0	0.0	4.2	4 2
150	6.3	0.0	4.7	4.7
160	5.1	0.0	4.9	4.9

The maximum effect on the gas was with oil at 100° F., when one passage through the scrubber reduced the candle power from 17.9 candles to 2.4 candles, and the hydrocarbons were reduced frem 6.3 per cent. to 4.9 per cent. In other words, reducing the hydrocarbons 1.4 per cent. by oil scrubbing, reduced the candle power 15.5 candles.

Experiment B.

Oil gas and lamp black water gas, 19.8-candle power.

	Per Cent.	
Carbonic acid gas	3.0	
Illuminants No. 1	1.5	8.4 per cent. total illuminants.
Illuminants No. 2	6.9	

This test was in every way similar to Experiment A, excepting the gas used had higher initial candle power and illuminants. The gas was scrubbed with crude oil 16.5° B.

Temperature, Oil, Degs. F.	Candle Power.	Illuminants, No. 1.	Illuminants, No. 2. Per Cent.	Total Illuminants. Per Cent.
70	2.9	..	6.0	6.0
80	2.6	..	6.0	6.0
90	2.9	..	6.2	6.2
100	2.3	..	6.2	6.2
110	2.5	..	6.4	6.4
120	2.8	..	6.4	6.4
130	3.2	..	6.6	6.6
140	3.8	..	6.4	6.4
150	4.1	..	6.0	6.0
160	4.0	..	6.4	6.4

In this experiment the maximum effect was also with oil of 100° F., when the oil scrubbing reduced the illuminants from 8.4 per cent. to 6.2 per cent., and the candle power from 19.8 to 2.3, thus showing that 17.5 candles of illuminating value were produced by 2.2 per cent.

of the volume of the gas, or by 26 per cent. of the illuminants contained in the original sample.

Experiment C.

Oil gas .....19.9 candle power.
Carbonic acid gas.. 2.2 per cent.
Illuminants, No. 1. 2.8 "
Illuminants, No. 2. 4.2 " } 7 per cent. total illuminants.

In this experiment the gas was scrubbed with a distillate of 24° B.

Temperature. Oil, Degs. F.	Candle Power.	Illuminants, No. 1, Per Cent.	Illuminants, No. 2, Per Cent.	Total Illuminants, Per Ct.
70.....	3.6	....	5.2	5.2
80.....	2.9	1.3	3.7	5.0
90.....	2.3	1.0	3.8	4.8
100.....	2.1	....	5.0	5.0
110.....	2.1	0.4	4.2	4.6
120.....	3.4	1.2	4.3	5.5
130.....	3.4	1.2	4.3	5.5

The greatest reduction in candle power in this experiment was with oil at 100° and 110° F., when the candle power was reduced from 19.9 to 2.1, and at 100° F. the illuminants were reduced from 7 per cent. to 5 per cent., or a loss of 17.8 candles by a reduction of 2 per cent. of illuminants. These experiments all demonstrate the instability of a portion of the hydrocarbons, and the large proportion of the total candle power produced by a small amount of illuminants.

The illuminants that are removable by oil contain the cause of all naphthaline deposits, and the bulk of condensation other than water in street main drips. They are the seat of candle power fluctuations, and are affected by changes in gas humidity, or water vapor content in the gas. They are also easily removable by compression. A glance at the tables of candle power would impress an observer that the scrubbing by oil had rendered the gas useless and unsalable, yet the calorific value of the gas remains practically undisturbed. The loss in candle power is not accompanied by any proportional or even significant loss in British thermal units. During the progress of the experiments, it was noticed that, after repeated use of the same oil for scrubbing, the oil becomes spent, or saturated by repeated exposure to hydrocarbons, and it was necessary to use fresh oil for each test. To determine the capacity of a given oil to absorb hydrocarbons the following experiment was made:

A small oil-scrubber was constructed, and a special sensitive balance was used for weighing the apparatus and its contained oil, and the increment due to the absorbed hydrocarbons.

The apparatus weighed ..... 1,740.2 grammes.
The oil used weighed ..... 118.0 grammes = 4.165 ozs.

Total weight of apparatus and oil .. 1,858.2 grammes.

The oil used was California crude petroleum, of 14.8° B., at 60° F., specific gravity, .9682, and weighing 8.055 pounds per gallon. Oil gas of 20.3-candle power was passed through the scrubber at a rate of 5 cubic feet an hour for 2 hours and then at the rate of 10 cubic feet an hour for a period of 1 hour 30 minutes.

The candle power was taken by Bunsen bar tests, and the lessened decrease in candle power shows the progress of the saturation of the oil by hydrocarbons, and finally its failure to absorb any more of the illuminants.

Oil Gas Used, 20.3 Candle Power.

Time.	Cubic Feet of Gas passed through Scrubber.	Candle Power after Scrubbing. Candles.	Lessened Decrease in Candle Power. Candles.
12:00 M. Start.....	.... ..	7.2	..
1:00 P. M. "	5	16.5	9.3
2:00 " "	10	18.7	2.2
2:30 " "	15	20.0	1.3
3:00 " "	20	20.6	0.6
3:30 " "	25	20.7	0.1

After scrubbing, the apparatus and oil weighed 1861.00 grammes, a gain of 2.8 grammes, equal to 2.37 per cent. in weight of hydrocarbons absorbed from 25 cubic feet of gas. The oil after having been used for scrubbing was 16.5 B., an increase of 1.7 B.

The following analyses of two samples of gas taken simultaneously show that oil removes nothing but hydrocarbons of the illuminant content of the gas.

Content.	Per Cent.		Per Cent.	
Carbonic acid gas.....	3.0		3.0	
Illuminants.....	7.7	No. 1.	1.6	7.7*
		No. 2.	6.1	
Oxygen.....	0.2		0.2	
Carbonic oxide.....	10.1		10.1	
Hydrogen	41.7		41.7	
Marsh gas.....	31.6		31.6	
Nitrogen.....	5.7		5.7	
	100.0		100.0	

Note. Illuminants No. 1 were removed by absorption in oil. Illuminants No. 2 were removed by absorption in fuming sulphuric acid.

Candle power, 19; B.T.U., 671; specific gravity, 408.

It is possible that a uniform system of gas making, using oil of even quality, through ranges of temperatures comparatively constant, may produce gas of which the candle power and heat units appear to bear a fixed relationship to each other. This relationship is misleading, however, as heat units and candle power are not entirely dependent, one upon the other, any more than the percentage of illuminants contained in the gas is a safe measure of candle power.

This is well illustrated by the following experiments. Oil gas of 19.6 candle power, and containing 7.7 per cent. of heavy hydrocarbons, was analyzed to determine its constituents. The benzene was removed with nickel-ammonium cyanide, the other heavy hydrocarbons with fuming sulphuric acid. Another sample of the same gas was analyzed, using the oil pipette, then the fuming sulphuric acid. And, finally, another sample of the same gas was passed through the oil scrubber and analyzed.

	Original Gas, Candles.	Gas after Oil Scrubbing, Candles.
Candle power	19.6	4.9
B.T.U. (by Junkers calorimeter).....	657.0	627.0
B.T.U. (by analysis)	715.0	689.0
Specific gravity.....	0.493	0.489

Analysis.

	Original Gas. Per Cent.	Original Gas, Using Oil Pipette. Per Cent.	Gas After Scrubbing With Oil. Per Cent.
CO_2.....	2.6	2.6	2.6
C_6H_6.....	1.0	....	....
CnH_2n (oil pipette).....	....	1.7	....
CnH_2n (fuming sulph. acid.	6.7	6.1	6.0
O_2.....	0.3	0.2	0.4
CO.....	10.0	10.2	10.3
H_2.....	37.5	....	37.7
CH_4.....	37.1	....	37.7
N_2.....	4.8	....	5.3
	100.0		100.0

The reduction in candle power, due to passing the gas through the oil scrubber, was 14.7 candles, or 75 per cent. The reduction in heating value by calorimeter was 30 B.T.U.'s, or 4.6 per cent., and by analysis was 26 B.T.U.'s, or 3.6 per cent. The experiment shows that 75 per cent. of the candle power of the gas was produced by 1.7 per cent. of illuminants, and that this great reduction in candle power only affected the heating value 4.6 per cent.

In some experiments in the making of coal gas (1901), gas made from bituminous coal was passed through a second chamber, containing highly heated coke, with the result that the hydrocarbons in the gas were entirely broken down and the finished gas was nonluminous, yet it had the characteristics of coal gas, excepting hydrocarbons, and contained about 700 British thermal units per cubic foot. Some of the unstable hydrocarbons in illuminating gas are theoretically very high in heat units; as, for instance:

Naphthaline.....	$C_{10}H_8$	6,176 B.T.U.'s per cubic foot.
Benzene.....	C_6H_6	4,010 " " " "
Propylene	C_3H_6	2,509 " " " "
Ethane.....	C_2H_6	1,858 " " " "
Ethylene.....	C_2H_4	1,673 " " " "
Acetylene..	C_2H_2	1,555[1] " " " "

The perfect and complete combustion of these illuminants should develop the theoretical high candle power and heating effect, but it is impossible under ordinary conditions to provide a perfect admixture of air to a burner, and the result is a smoky flame, or loss of heat.

The Bunsen burner attachment for consuming gas in the calorimeters of the Junkers' type will not develop the theoretical heat

1. Stillman's "Engineering Chemistry."

units of any of these hydrocarbons, if burned undiluted. Acetylene, one of the illuminants of our city gas, and now commonly used as an illuminant for automobiles, has a calculated heating value of 1,555 B.T.U.'s per cubic foot, and yet this gas cannot be burned with an air mixture in a Junkers, calorimeter, and an imperfect test of it would not develop more than half of its calculated heat units. This being true of the richer hydrocarbons burned separately, may it not be true also of different mixtures of these hydrocarbons with diluents, burned through a Bunsen burner of a calorimeter, intended for testing gases of more uniform composition, and apparently readily burned in that type of burner. The fact that the results of calculating heat units from analyses are invariably higher than those obtained by calorimeters of the Junkers' type seems to prove this assertion.

The adoption of a heat unit standard will not permit the gas manufacturer to make an inferior gas, nor to vitiate the gas with inert, or impure gases. It will simply enable him to make a more stable gas which will withstand the shocks of changes of temperature and humidity, and the effect of friction in pipes and fittings. To fulfill the requirements of a standard of 500 B.T.U.'s per cubic foot, the gas would have to contain a large percentage of marsh gas, or other stable hydrocarbons. Hydrogen alone would not meet this requirement, for although it is an exceedingly hot gas, when considered by weight, it is also a very light gas and contains but 344 B.T.U.'s per cubic foot. Carbonic oxide has a value of 343 B.T.U.'s per cubic foot, and, either alone or mixed with hydrogen, would not meet the above requirements.

Where water gas is now used as an enricher of coal gas, in the event of the adoption of a heat unit standard, the water gas may be used as a diluent heating gas, consisting mainly of hydrogen, marsh gas, carbonic oxide, and a small amount of stable illuminants. This gas would help to dilute, sustain and consume the illuminants of coal gas.

Some of the California natural gas of the Midway field, now being supplied to Bakersfield, contains as much as 99.1 per cent. of marsh gas and has a heating value of 1,063 British thermal units per cubic foot. This is a good heating gas, and may be used for illumination in incandescent burners, yet the gas has little, if any, candle power.

Calorimetry is more nearly an exact science than photometry, because the total heat of combustion of gas may be measured by accurate thermometers, or the theoretical heat units may be quickly calculated from analysis. There are also many ways of burning the gas with oxygen (notably Hempel's), whereby the heating value of the gas may be determined without any practical error.

In changing from the candle power to the heat unit standard, all of the errors which enter into photometry are eliminated, and not the least of these is the personal error of the observer, sometimes amounting to as much as 10 per cent. For, after all of the refinements of photometric testing have been practiced, the final determination of the candle power must rest upon the visual impression of light upon the human retina, and there are no instruments for measuring the fallibility of human judgment.

Gas of 500 British thermal units to the cubic foot would be a satisfactory gas for the use of the consumer. It may be non-luminous, but would probably be a gas of low candle power, and it would not in any sense be a poor gas, nor could it be carelessly made. Such gas would stimulate new uses for gas, and these new uses would increase the production, thus resulting in economies in manufacture, redounding to the benefit of the manufacturer as well as the consumer.

Liability for Destruction of Property by Ignited Oil.

In an action (Jennings *vs.* Davis, Circuit Court of Appeals, 187 Fed. 703) for damages for the destruction of property, the plaintiff was the owner of a dwelling house and another house, used as a blacksmith's shop by a third person, and the defendant maintained a 6-inch, trunk, oil pipe line laid along the same side of the public road as the plaintiff's buildings. At a point about 75 feet from the plaintiff's house was a Y-joint, into which ran a 4-inch branch oil pipe line running to a pumping station about a mile distant. Into this branch line, about 5 feet from the connection, was inserted a flange. Between the flange and the Y connection, in the 6-inch main line, was installed a valve. The custodian of the dwelling house one evening discovered oil around the house which came from a leak in the flange. She telephoned to the nearest pumping station. The leak, which was due to the blowing out of the gasket, was not repaired that night, on account of the danger of igniting the oil; that was done next morning. The oil had run around the house, then down along the line about 200 feet, stopping at the blacksmith's shop. Next morning the blacksmith made a fire in his forge, heated a piece of iron to shoe a horse, placed it upon the anvil and cut off a part of it, which fell on the floor, rolled through a crack into the oil under the shop, causing a fire which instantly followed the oil up to the barn and house, resulting in their destruction in a few minutes. The blacksmith had to step over the oil to get into his shop and was warned that it was dangerous to put fire in his forge. On appeal from the Circuit Court of West Virginia, judgment for the plaintiff was reversed and a new trial ordered for the following reasons: The trial court erred in instructing the jury as to the defendant's duty in regard to care. The degree of care required was that which would be exercised by a person of ordinary prudence under the same circumstances and conditions if the whole risk were his own, and not such a high degree of care as would absolutely prevent the leakage of oil under any circumstances. The mere fact that a leakage was caused by the blowing out of the gasket did not constitute evidence of negligence in the construction or operation of the pipe line or in the quality of the materials used. There was no evidence of negligence in regard to inspection. The evidence showed that it would have been dangerous to interfere with the oil during the night. Whether the defendan should have placed a watch upon the premises during the night was immaterial, as no injury resulted from its failure to do so. Assuming that the defendant was negligent in failing to cover or remove the oil as soon as possible, it was the act of the blacksmith which was the proximate cause of the plaintiff's loss. That act was the act of an independent intervening agent for which the defendant was not liable, and it was negligent as matter of law. The defendant could not reasonably have foreseen or anticipated that he would go to the shop in the early morning—see the oil—light the fire—heat the iron—cut off a piece so that a part, red hot, would probably fall through a crack in the floor into the oil.

Tribute to the Memory of the Late Mr. Robert Morton.

"W. T. L.," prepared the following tribute, *in memoriam*, to Mr. Robert Morton, formerly Chairman of the Board of Directors, South Metropolitan Gas Company, London, England, for the October number of the "Co-Partnership Jonrnal," printed by the South Metropolitan Gas Company:

For the second time this year the shadow of death, that shadow which by its darkness proves the presence and power of the light behind it, has fallen on our Board of Directors. At the beginning of the year we had to mourn the loss of Captain Heathorn, and now we, in common with our South Suburban neighbors, have lost Mr. Robert Morton, an engineer of repute, a business man of proved ability, a zealous supporter of co-partnership, and a man who long ago did much to improve the condition of gas workers.

Mr. Morton was a gas engineer of the old school, and was for 15 years Engineer to the London Gas Light Company, at Nine Elms, having been previously Engineer at Woolwich and Vauxhall. His invention of self-sealing retort lids made his reputation world-wide among gas companies. On December 2, 1872, he was elected a member of the Institution of Civil Engineers. In 1876 he was President of the British Association of Gas Managers, and in his address he made some characteristic remarks with reference to workingmen:

"I would not grudge them the high pay * * * if they would simply give a fair return for it; and a fair return is, I consider, something more than a certain *amonnt* of work done anyhow; it includes a regular attendance at it, a willing and hearty way of doing it, an attention to rule, a consideration for their employers' interests, and a care for their property."

Such was Mr. Morton's ideal of work, and he was willing that it should be well remunerated. In the work of establishing our co-partnership he was throughout a loyal supporter of his old friend, Sir George Livesey, with whom he had been closely associated in the early seventies in the battle for the reduction of Sunday labor.

It was on August 18, 1886, that Mr. Morton was elected a Director of our Company, and his last attendance at the Board was on August 23 last, so that he completed 25 years' faithful service to the proprietors. He was appointed Chairman, October, 1908, after the death

of Sir George Livesey, and resigned that position on the 9th of the following December in order that Mr. Carpenter might be elected.

His death occurred at Bournemouth, Thursday, September 14, at the age of 76, and he was laid to rest in the "God's acre' of that beautiful seaside town on the following Monday. His memory will be cherished by many, especially by those who knew him best and learned something of his sterling qualities. A link with the past is broken by his departure; six of the seven Directors who, in 1889, gave us the co-partnership scheme, are now gone from us. But still their work endures, and will endure, as a lasting memorial of men who faced a great industrial problem in a spirit of justice and brotherhood.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

1,004,625. Gas Regulator. F. M. Brooks, New York City.

1,004,678. Gas Tube Tip. A. W. Nicholls, East Norwalk, Conn.

1,004,794. Gas Cut Off Apparatus. C. G. Keeton, Kansas City, Mo.

1,005,011. Cleaning Device for Gas Collecting Mains. L. C. Flaccus, New York City, assignor to Stettiner Chamotte-Fabrik Actien-Gesellschaft vorm. Didier, Stettin, Germany.

1,005,210. Gas Producer Apparatus. J. A. Herrick, New York City.

1,005,328. Water Seal for Gas Generators. A. E. Schlieder, Buffalo, N. Y., assignor to Model General Company, Louisville, Ky.

1,005,460. Inverted Lamp Burner. E. H. Palmer, Detroit, Mich.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. A. L. OPDYKE, writing from Pittsburgh, Pa., under date of the 13th inst., says: "I fail to notice in the columns of 'Old Reliable' any mention of the death of Mr. George Reznor, who passed away, at his home in Mercer, the morning of September 23d. Knowing that his fame in the gas industry was (especially amongst those who are termed old-timers) considerable, I venture to send you this short account of his work, which was prepared with care for the Pittsburgh *Leader* of recent date: 'George Reznor, aged 76, manufacturer, inventor and civil war veteran, died at his home in Mercer the 23d ult. Deceased was born November 9, 1835, in Lancaster county, and, after attending the country school of his district, entered the service of the Cleveland Engineering Company. Later on he began to read medicine in the office of a brother, who was a Cleveland physician and surgeon. In June, 1861, he responded to the great Lincoln's call for volunteers, and, abandoning his studies in medicine, came to Mercer to enlist in the Mercer Rifles, which later on became Company G of the Tenth Volunteer Reserve Corps. Prior to being mustered out of service he had attained the rank of Sergeant. Returning from the scene of action he became interested in the politics of Mercer, and eventually was choson Clerk of the County Court. The great number of orphan children, who were brought to this condition through the ravages of war, caused deceased, acting in conjunction with his brother-in-law (the late J. G. White), to establish a school in Mercer for their better maintenance and education, State legislation having been successfully invoked to further these philanthropic ends. The school having been satisfactorily established, Mr. Reznor released his share in the enterprise to Mr. White and formed the drug firm of Reznor & Williams, and later on that of Reznor & Garber. During this period deceased became widely known in gas circles through the perfecting of a gasoline gas process, and later on devised a gas stove, which is well known in the practice of the gas industry of to-day. This apparatus is being manufactured in the shops of the Reznor Manufacturing Company, of Mercer, Pa. In 1857 he married Miss Alice McKinney, daughter of John N. McKinney, who was Sheriff of Mercer county, and she survives him, with six of their children. He was a man of simple tastes, active mind, scrupulous honesty and lovable nature."

GEN. GEORGE H. HARRIES, formerly Vice-President of the Washington (D. C.) Railway and Electric Light Company, has attached himself to the operating staff of that sterling corporation, known as H. M. Byllesby & Co. His headquarters will be in Chicago. The General gained his title in the recent Spanish-American contention, and is President of the Association of Edison Illuminating Companies, Treasurer of the National Electric Light Association, and Second Vice President of the American Electric Railway Association.

MR. N. L. ABRAHAM, who, since 1899, had been in charge as Superintendent of the East End Station, Cincinnati (O.) Gas Works, prior to the city being turned over to natural gas, resigned from its service recently. We are not informed as to his new field of work, but wherever he goes we wish him the best of good fortune.

MR. GANO DUNN has returned from abroad, where, as a representative of the United States Government, and as President of the American Institute of Electrical Engineers, he has been attending the sessions of the International Electrical Congress, at Turin, and the meetings of the International Electro-Technical Commission, which body was organized to forward the plan of bringing about an international uniformity of standards and practice in the electrical industry. Mr. Dunn, who for many years was Chief Engineer of the Crocker-Wheeler Company, and is a past-President of the New York Electrical Society, has been elected a Director in and a Vice-President of Messrs. J. G. White & Co., Incorporated.

THE following advertisement is being published in the local papers, and posted in the shape of "stickers" on about everything publicly available in Quitman, by the women residents of the named place:

Wanted,
By the Housewives of Quitman,
a
Gas Plant.

THE Freeport (Ills.) Gas Light and Coke Company has secured the services of Mr. T. F. Andrews, of Kansas City, Mo., to act in the capacity of its industrial fuel expert and demonstrator.

WE are informed that Messrs. John H. Gibbs, A. J. Robus, H. C. Dueing, Joseph Stevens and J. M. Klein have formed the Citizens Gas and Fuel Company, of De Soto, Mo., to "deal in gas plants, franchises, etc." It is capitalized in $100,000.

THE Terry Turbine Company's type of apparatus seems to be finding considerable favor, the Georgetown (D. C.), and the Roanoke (Va.) Gas and Water Companies having recently purchased 2 of these sets, which are direct-connected to a 3,100 C. F. M. blower. The Southern Gas Company, of Miami. Fla., also purchased a set similar to those above-named. Other recent and larger sets (105-horse power, direct-connected to a 13,000 C. F. M. blower) to the Washington (D. C.) Gas Light Company—this is a repeat order; two 12½-horse power sets for the Bucks County (Pa.) Public Service Corporation, at Langhorne: and a 7½-horse power set to the Mutual Gas Company, of St. Johns, Mich.

THE Deily & Fowler Manufacturing Company, of Philadelphia, Pa., has recently put forth a handsome pocket folder, the main feature of which is an illustration of the Company's standard type of small holder—up to retaining 100,000 cubic feet—in steel tank (2-lift type), examples of which can be practically examined at these 5 points: Cortland and Norwich, N. Y.; Sunbury, Pa., Wildwood, N. J.; Miami, Fla.

MR. A. L. EUSTICE, Secretary, Chicago Section, Illuminating Engineering Society, is to be congratulated on having secured Dr. Herbert E. Ives to (as the Secretary termed it) fire "The Opening Gun of the Season." Mr. Ives (he is also Vice-President of the Chicago Section) has returned quite recently from a trip covering some weeks which was spent in Europe, the time being mainly taken up with a study of the artificial lighting conditions in the many places visited. The gun was loaded with "Random Notes on Light and Life in Europe," and the narrative thereof was an output of matter that brought pleasing harmonies of instruction rather than the outburst of shattered fancies. The Doctor is, as the Society's members well know, a most entertaining speaker, which counts for much when the speaker is equipped (as he certainly is) with substantial knowledge of his subject. The meeting place was in the "Savage Club Room," and the lecture was preceded by a satisfying dinner, that was well served in the cozy rooms of the Kuntz-Remmler Restaurant, 424 South Wabash avenue.

MR. B. W. BATES is informed that Mr. Chas. F. Linsley (formerly Vice-President of both the named corporations) was elected President of the Meriden (Conn.) Gas Light Company and of the Meriden Electric Light Company at special meetings of both Companies Directors,

the afternoon of the 14th ult., succeeding the late Mr. Walter Hubbard. Mr. Linsley has been on the Board of each Company since 1898. His successor as Vice-President of the gas division of the enterprise will not be made until the annual meeting.

THE Superior Court, sitting in Philadelphia, handed down several opinions, as of the 10th inst., one of which (Margaret Soles *vs.* Peoples Natural Gas Company, Allegheny county, on appeal) is of especial interest to gas men. We have heard only the merest details, but the finality of the case is this: Mr. Justice Head wrote the opinion, which reversed the finding of the lower Court, in which plaintiff obtained a substantial sum for damages occurring through an explosion of gas—the inferior Court was Common Pleas, No. 4. Justice Head directed judgment for the defendant on its motion for judgment, notwithstanding the verdict. Justice Head declares that when the employees of the Company notified the plaintiff that there were leaks from the piping in her house that its responsibility in the premises was at an end.

MR. F. A. LEACH, JR., Manager of the Oakland (Cal.) Gas, Light and Heat Company, has informed the residents that, beginning the first prox., the maximum selling rate for all purposes, and on all accounts, would be 90 cents per 1,000 cubic feet; but in cases where the consumption exceeded 10,000 cubic feet per month, the rate would be 75 cents per 1,000 on all quantities in excess of the first 10,000. The ruling rates are: On illuminating account, $1 per 1,000; for fuel use, 90 cents per 1,000.

THE Schiller-Pickenpaugh combination asserts that construction work, on the proposed plant for Edwardsville, Ills., will be commenced certainly by November 1st. We hope so.

MR. CHARLES W. BUTTERWORTH, Superintendent of the Milton (Pa.) Gas Company, and also President of the Pennsylvania Gas Association, has been appointed to a responsible position on the staff of the United Gas Improvement Company, with headquarters in the home office.

WORK on the distribution system of the South Shore (Long Island) Gas Company is going ahead again, and the promoters say that Amityville (the extreme western limit of its franchise grant) will be hooked up before frost sets in. And all through the late summer, which was noted for its benignity in respect of such work, there was not a thing doing.

THE plant and franchises of the Alpena (Mich.) Gas Light and Fuel Company were sold at auction, under foreclosure proceedings, some days ago. The properties were knocked down to Mr. F. C. Young, of Grand Rapids, representing the bondholders, at his bid of $64,000. The plant will be kept in action under the direction of Mr. Chambers. It is likely that considerable betterment will be made on the works.

THE City Council, of Manhattan, Kas., is considering the advisability of granting a franchise to Mr. J. G. Boyle and associates, of Vinton, Ia., for the right to there operate a gas works.

THE proprietors of the Wichita (Kas.) Gas and Electric Light Company have purchased the belongings of the Newton (Kas.) Electric Light and Power Company. Mr. J. D. Nicholson will remain in charge.

MR. S. E. MARCOTT, from his seat of vantage in the Board of Aldermen, De Pere, Wis., insists again that De Pere shall have a gas plant, and accordingly the local electric light company has been instructed to examine the matter and report to the Board.

MR. CHARLES D. F. SMITH, for 10 years connected with the legal department of the Peoples Gas Light and Coke Company, of Chicago, died at his home in Chicago the morning of the 13th inst. He was in his 46th year.

MR. R. S. VAIL, writing from Seattle, Wash., under date of the 16th inst., incloses this: "In an opinion submitted to the City Commission of Spokane Falls, Wash., some days ago, Corporation Counsel Craven rules that not only should the local Gas Company pay the city 2 per cent. of the gross revenue, which it has been paying under the old ordinance, instead of 1 per cent., but should also pay a 1 per cent. revenue tax as well. He recommends that a bill for the total balance due under his scheme be rendered, in the event of the Company refusing to agree with Mr. Craven, which refusal," as our correrpond ent rather naively or ingenuously adds, "is not at all unlikely." In an investigation of the Company's accounts Deputy City Auditor Curtis determined that, since 1904, the Company had paid into the city treasury the sum of $11,123.73, which equals 1 per cent. of the gross revenue, and he argued that $8,424.87 is still due under his construction of the taxation plan. In 1907 the old Seattle Company was taken over, or rather was combined with the Union Gas Company, the franchise for which called for the payment of 1 per cent royalty. The combined concern has been operating since under the Union charter, so the payment was made under the provisions thereof. Now, however, the Corporation Counsel, craving double taxes, seeks to collect from the living and the dead. His contention is surely a hard one to seriously consider, but the subtleties of legal definings are often amazing, frequently perplexing, and occasionally ridiculous. And the Craven pronunciamento seems decidedly to belong to the last named sort."

TO-MORROW the shareholders of the Springfield (Mass.) Gas Light Company will convene in annual session, and a prime matter for consideration will be their determination in respect of the proposition to take over for consolidation the properties of the Chicopee (Mass.) Gas Light Company.

MR. THOS. D. HARRYMAN, who died at the home of his brother, 335 East 22d street, Baltimore, Md., the night of the 10th inst., was the ranking veteran in the gas service to that city. He began with the old Baltimore Gas Company, at its Spring Gardens plant, and remained with the corporation in all the successive changes that have marked it since 1865. He advanced from the lowest rank to be Superintendent of the Company's Bayard street station, which post he held at the time of his death. He was in his 67th year, and six children survive him. The funeral took place the 13th inst., and a feature thereof was the attendance of a large delegation from the ranks of his associates in the service of the Consolidated Gas, Electric Light and Power Company.

THE affairs of Mr. George W. Pepper, of Philadelphia, as receiver for the assets of the Bay State Gas Company, of Delaware, have been terminated with his release therefrom by the United States Circuit Court, Boston District, some days ago. The balance to credit ($43,874) was turned over to Mr. Homer Albers, in his capacity as treasurer for a syndicate of creditors. The lawyers had some fine pickings out of the Bay State carcass.

A NEW phase in the lighting supply of Carlisle, Pa., was developed when the Carlisle Gas and Water Company applied for a franchise to operate the Carlisle Electric Light, Heat and Power Company, the charter for which was recently filed with the State authorities. The object of this is to effect a combination with the Gas and Water Company for the purpose of enlarging the business thereof. The interests in the new and old concerns are to all intent identical.

THE proceedings instituted by the authorities of Des Moines, Ia., to enforce an ordinance compelling the Des Moines Gas Company to sell gas at 90 cents per 1,000 cubic feet are to be transferred to Buffalo, N. Y., where the hearings before the Master in Chancery (Judge Robert Sloan) will be continued. This determination was reached after the Company had submitted arguments favoring its contention that a fair trial on the merits could not be had in Des Moines. The opinion in the substitution case was rendered by Judge Leavitt McPherson.

"W. W. M.," writing from Los Angeles, Cal., under date of the 10th inst., forwarded the following: "Reversing the judgment of Superior Judge Walter Bordwell, as affirmed by the District Court of Appeals, the Supreme Court handed down a decision, in the case of Notthof *vs.* the Los Angeles Gas and Electric Company, damages being assessed at $20,000. Plaintiff was Chief Engineer of the defendant Company as to its electric station on Palmetto and Alameda streets, and on July 5, 1907, he fell into a sump hole on the premises. It was filled with hot water and he sustained a severe scalding. In March, 1908, the initial suit for damages was tried before Judge Bordwell, who, having heard testimony on plaintiff's behalf, granted defendant's motion for nonsuit. Plaintiff took the case on appeal to the District Court of Appeal, which tribunal affirmed the lower court. Notthof next appealed to the Supreme Court, with the result of the ordering of a reversal. Court of last resort avers that the case, when first brought, should have been tried on its merits."

The Market for Gas Securities.

Well, despite sharp "drives," underhand, overhand and otherwise, at "trusts" of one sort or another, Consolidated not only managed to hold its own, but actually to score a ½ point advance in the week. It came in at noon to-day (Friday) at 138¼ to 138⅝, and the tone seemed positively firm. It is again said that the day of share readjustment approaches; if so, beware of selling the market.

Brooklyn Union is dull but closely held, the quotation for it being 134 to 137—just 60 points less than actual value. Both Chicago and Lacledes are also on the improving list. Good bonds are in active demand. The regular 1¼ per cent. on Peoples, of Chicago, has been declared. The general outlook is good.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

OCTOBER 23.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$73,177,000	100	138⅛	138¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	8,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	134	137
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅝	¼
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,680,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	113	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	88	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	104¼	104½
Preferred	2,500,000	100	114	120
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,370,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	106¾
Massachusetts Gas Companies, of Boston	25,000,000	100	91	91½
Preferred	25,000,000	100	93	93¾
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	106¼	107¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	448	450
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ———— Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Next meeting, Syracuse, N. Y., Nov. 1911. Officers: President, R. M. Searle, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E. Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. ————1912, ———— Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 16 East 40th street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, A. L. Eustice, 105 North Wabash avenue.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Clinton, Ia. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, Sept. 1912. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. ————1912;———— Officers: President, F. W. Blowers, Kalamazoo, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, October 23-26, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912; Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association.—Annual meeting, February 6 and 7, 1912, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary-Treasurer, T. C. Jones, Delaware, O.

Pacific Coast Gas Association.—Annual meeting, Sept. ————1912, ———— Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice-President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers, President, C. W. Butterworth, Millon, Pa; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 39th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers, President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon. Milwaukee, Wis.